COMPUTER & VIDEO GAMES

Computer & Video Games

OCTOBER 1982

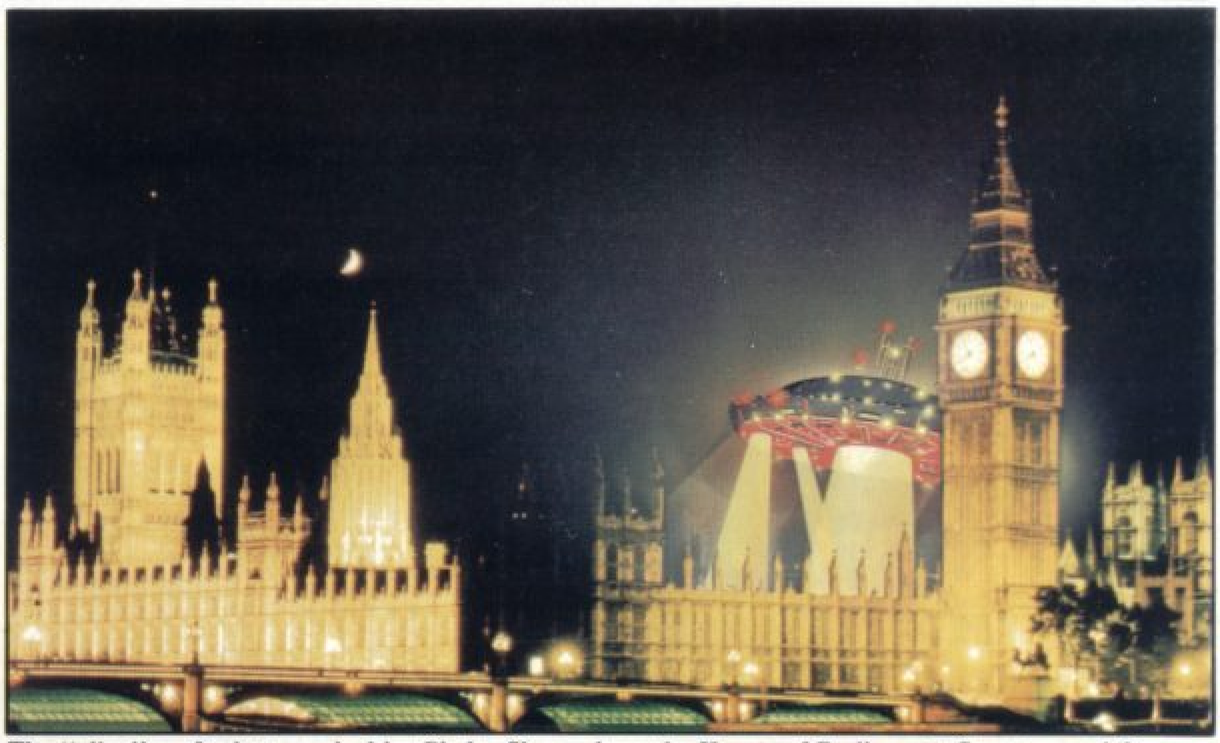
75p

SPACE WATCH

By Ray Darskan

FOLLOWING the astonishing spate of UFO sightings, the government has set up a special agency to investigate the possibility that an alien invasion is already taking place.

The new agency, which is to be stationed at a top secret base in Potters Bar, Hertfordshire, will be codenamed Space Watch and its charter is currently being drafted out by Whitehall.



The "alien" craft photographed by Gladys Shane above the Houses of Parliament. See story on left.

Informed sources tell me that among the special powers it is likely to be able to exercise, include:

- Stop and search procedures on any craft suspected of harbouring alien life.
- Close monitoring of unusually active radio wavebands with a special reference to the CB channels, where many people already claim to have overheard "alien conversation rituals".
- Direct access to the radio telescope network and its search for the regular pulses which could indicate signs of intelligent life in the UK — Willesden has already come in for close attention.
- And finally — and most controversially — the power to interrogate individuals who sight UFOs or claim any kind of "close encounter" with extra-terrestrial life. They have already had 76-year-old Gloucestershire grandmother Gladys (Ma) Shane (whose now famous photograph of a flying saucer over London is pictured right) closeted away in Potters Bar for over six days.

And we do know that a **Sinclair Spectrum** microcomputer has been pressed into service to assimilate information on sightings.

Naturally the Government finds it difficult to admit the existence of agencies like Space Watch.

Foreign Body Office spokesman, Sir Geoffrey Robertson, confessed as much yesterday.

He denied that Space Watch exists in current Government thinking and said: "It only takes on person to make claims about a secret government agency and everyone starts seeing them."

On being assured that a Government White Paper on Space Watch had already been published, Sir Geoffrey said.

"This is exactly the sort of mass hysteria I just described."

And asked to comment on the recent *Sun* story: "Ma Shane's in Potters Bar", he confirmed that, "She is helping us look into developments on her photograph.

I asked Sir Geoffrey to comment on current rumours that he himself has some 37 eyes on small green stalks. He said that the number was greatly exaggerated and anyway, the stalks were more the sort of mid-blue found in Arterian sunsets.

Galaxian Colony II!

By Our Science Correspondant

A COLONY of creatures from another galaxy are approaching Earth in a war-like formation, according to a report in the science journal *"Which Cosmos?"*

The author of the report, "Professor" Francis Cover D'Ingham claims the aliens will reach Earth in early November and feels they may make their landing under cover of firework displays.

He says that other scientists have come up with the same evidence he has, but have chosen to put forward different theories to explain it.

Says the professor: "Just because these aliens' spacecraft aren't as spectacular as those created in the films *Star Wars* or *Close Encounters,* science tends to laugh them off. But although their spaceship design is admittedly lousy, the danger they represent is very real".

He first hit the headlines in the '70s with claims that Galaxians were on their way to Earth.

The professor, who claims a doctorate in Alien Fauna, gained, he says, at the University of Extra-terrestrial life, has been written off by successive governments as "A complete and utter crank". But his beliefs gained new credence this year following his now validated prediction that Italy would win the World Cup.

He has done most of his work on an **Apple Computer** using AlienCalc software in a study of TV crisp and instant potato commercials.

NEW ALIEN PANIC

in wild strawberry patch

By Tom Sancukes Country Staff

A WILTSHIRE market gardener says he has killed an alien being in his wild strawberry patch.

Alfred Hickey made his claims to police after a struggle with the alien among his greenhouses and orchards just outside Swindon.

During the fight, Hickey says, the alien fell into a hole he had previously dug in an area of his allotments overrun by wild strawberries. He hit the creature over its "red squishy head" with a shovel before burying it in the ground.

But when armed police dug into the ground where Hickey claims to have finished off his adversary, they only found strawberry remains — these are currently being analysed by forensic scientists.

Said Hickey: "I was out in the apple orchard inputting size readings onto my **Atari** microcomputer when this scarlet horror leapt at me from behind the compost heap.

"Grabbing the nearby shovel, I fought back chasing it into the greenhouse complex.

"I got in a couple of good slugs by the growbags, although it tried to do a runner, I eventually forced it into this hole in the strawberry patch where I finished it off.

"It's caused no end of damage, I only hope this sort of thing is covered by my insurance. First those French Golden Delicious, now this!"

Hickey showed our reporter where the struggle had taken place and it would seem to have been a particularly violent one.

"I've already had some UFO protection league onto me about preserving alien fauna," said an unrepentant Hickey. "But what these people don't realise is that this was a me-or-it situation."

A police spokesman said: "We get this every week, last Thursday, it was a rabid gooseberry among his tomato pots."

Hungarian Squares Puzzle

By Ivor Storey In Budapest

THE INCREDIBLE sequence of disappearances from Eastern Bloc countries has been credited to a "Bermuda Triangle" effect.

Over 27 dissident hikers who have gone missing under mysterious circumstances in the past six months are now believed to have entered areas where the Hungarian Squares phenomenon exists.

Apparently only right-thinking supporters of Soviet ideals can pass through these areas safely, says the report, which is based on data put together by a **Texas Instruments 99/4a** microcomputer.

COMPUTER & VIDEO GAMES

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OCTOBER 1982 No. 12

News & Reviews



Look out! Here come the Kamikaze aliens, dropping from the sky like little green hailstones. Catch them on page 44.

Watch this space

In September we proudly boasted that this was going to be the issue which put a capital "G" in *Computer & Video Games.*

An optimistic prophecy considering my ineptitude with a typewriter shift key, but there they are and we hope you like them.

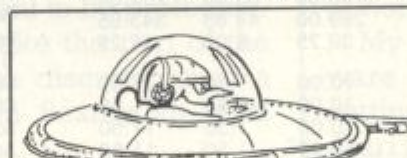
Kate Clements' Space Watch gives a whole new look to Alien Invasion games and may revolutionise Mastermind-type code games too. But if making friends with the aliens smacks too much of pacifism then Kamikaze and Sharp Defender should make amends.

Brick Blaster gets this month's Government Health Warning: this game is addictive and may damage your keyboard's health.

Listings







Features

Editor Terry Pratt, **Staff Writer** Eugene Lacey, **Editorial assistant** Susan Cameron, **Design** Linda Freeman, **Production editor** Tim Metcalfe, **Advertisement manager** Rita Lewis, **Advertising executive** Neil Wood **Advertisement assistant** Louise Flockhart, **Publisher** Tom Moloney

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Cover: Design; Linda Freeman. Photograph; Industrial Art Studio

REW

MICRO COMPUTERS

ATARI

		Nett	V.A.T.	Total
A400	16K RAM Computer (without manuals)	173.90	26.09	199.99
AM400	16K RAM Computer (with manuals)	216.52	32.48	249.00
AM800	16K RAM Computer (with manuals)	433.91	65.09	499.00
410	Cassette	43.47	6.52	49.99
810	Disk Drive	260.00	39.00	299.00
CX853	16K RAM Expansion	56.52	8.48	65.00
Calisto	32K RAM Expansion	77.39	11.61	89.00

Application Software

		Nett	V.A.T.	Total
Atari CX 404 Word Processor	(Disk)	86.94	13.05	99.99
Atari Visicalc	(Disk)	103.47	15.53	129.00
Draw Pic	(Disk & Cass)	23.04	3.46	26.50
Mail List	(Disk)	30.43	4.57	35.00

Entertainment Software

		Nett	V.A.T.	Total
Caverns of Mars	(Disk)	26.07	3.92	29.99
Centipede	(ROM)	26.07	3.92	29.99
Star Raiders	(ROM)	26.07	3.92	29.99
Music Composer	(ROM)	26.07	3.92	29.99
Missile Command	(ROM)	26.07	3.92	29.99
Pac Man	(ROM)	26.07	3.92	29.99
Adventures 1 to 12	(Cass)	14.34	2.16	16.50
Adventure Tri Packs	(Disk)	24.00	3.60	27.60
Arcade Baseball	(Cass)	17.82	2.68	20.50
Player Missile Editor	(Cass)	21.30	3.20	24.50
Temple of Apshai	(Cass & Disk)	24.00	3.60	27.60
Star Warrior	(Cass & Disk)	24.00	3.60	27.60
Apple Panic	(Disk)	17.82	2.68	20.50
Crush Crumble & Chomp	(Cass & Disk)	18.04	2.71	20.75
Wizard & the Princess	(Disk)	19.78	2.97	22.75
Jaw Breaker	(Cass & Disk)	17.82	2.68	20.50
Eastern Front	(Cass & Disk)	19.56	2.94	22.50

B.B.C. MICROCOMPUTER

		Nett	V.A.T.	Total
BBC Model A	16K RAM	Price on Application		
BBC Model B	32K RAM	Price on Application		
BBC Disk Drive		Price on Application		
BBC Printer		Price on Application		

Software

	Nett	V.A.T.	Total
BBC Space Warp	10.00	1.50	11.50
BBC Golf	6.09	0.91	7.00
BBC Backgammon	6.96	1.04	8.00
BBC Multifile	21.74	3.26	25.00
BBC Chess	10.00	1.50	11.50

ACORN ATOM

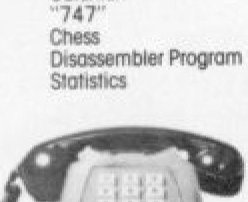
		Nett	V.A.T.	Total
Acorn 8K + 2K RAM Assembly		150.00	24.50	174.50
Acorn 12K + 12K RAM Assembly		250.00	39.50	289.50
Family Packs		173.00	27.00	200.00
Seikosa G.P. 80A Printer		199.00	33.00	232.00
Atom Disk Pack		299.00	44.85	343.85
Atom Colour Card		39.25	6.00	45.25
Software				
Games Packs I to II	(each)	10.00	1.50	11.50
Maths Packs I & 2	(each)	10.00	1.50	11.50
Soft VDU Pack		10.00	1.50	11.50
Database Inc Manual		10.00	1.50	11.50
Peeko Pack		10.00	1.50	11.50
Adventures		10.00	1.50	11.50
2K Programs I, 2 & 3	(each)	3.91	0.59	4.50
Galaxian		6.96	1.04	8.00
"747"		6.96	1.04	8.00
Chess		7.83	1.17	9.00
Disassembler Program		3.48	0.52	4.00
Statistics		17.39	2.61	20.00

COMMODORE VIC20

		Nett	V.A.T.	Total
VIC – 20 Computer 5K RAM		155.65	23.35	179.00
VIC C2N Cassette Unit		39.09	5.86	44.95
VIC Printer		200.00	30.00	230.00
VIC Single Disk Drive		344.45	51.55	396.00
VIC 3K RAM Cartridge		26.04	3.91	29.95
VIC 8K RAM Cartridge		39.09	5.86	44.95
VIC 16K RAM Cartridge		65.17	9.78	74.95
VIC Programmers Aid Cartridge		30.39	4.56	34.95
VIC Super Expander High Res		30.39	4.56	34.95
Application Software				
Simpli-Calc	(Disk)	21.70	3.25	24.95
Simpli-Calc	(Cass)	17.35	2.60	19.95
VIC Stock Control	(Cass)	17.35	2.60	19.95
VIC File	(Disk)	21.70	3.25	24.95
VIC Writer	(Disk)	21.70	3.25	24.95
	(Cass)	17.35	2.60	19.95
Entertainment Software				
Rat Race	(ROM)	17.35	2.60	19.95
Gorf	(Cass)	21.70	3.25	24.95
Jelly Monsters	(ROM)	17.35	2.60	19.95
Sargon 2 Chess	(ROM)	21.70	3.25	24.95
Rabbit Chase				
Skier				
Asteroids	(Cass)	6.08	0.92	7.00
VIC Panic	(Cass)	6.08	0.92	7.00
Cosmiads	(Cass)	6.08	0.92	7.00
VIC Men	(Cass)	6.08	0.92	7.00
Arfon Expansion Boards		85.21	12.79	98.00

TEXAS TI99/4A

		Nett	V.A.T.	Total
TI99/4A – 16K RAM		173.04	25.96	199.00
Speech Synthesiser		82.60	12.40	95.00
80 Column Matrix Printer		347.82	52.18	400.00
Peripheral Expansion System		144.34	21.66	166.00
Disk Controller Card		122.03	22.31	140.34
32K RAM Expansion Card		176.47	26.48	202.95
Cassette Cable		8.65	1.30	9.95
Application Software				
Speech Editor		15.60	2.35	17.95
Personal Record Keeping	(ROM)	38.21	5.74	43.95
Personal Report Generator	(ROM)	38.21	5.74	43.95
Personal Financial Aids	(Cass)	7.78	1.17	8.95
Inventory	(Disk)	46.04	6.91	52.95
Invoicing	(Disk)	46.04	6.91	52.95
Mailing List	(Disk)	46.04	6.91	52.95
Text Formatter	(ROM & Disk)	46.04	6.91	52.95
Entertainment Software				
TI Invaders	(ROM)	16.47	2.48	18.95
Munchman	(ROM)	23.43	3.52	26.95
Chess	(ROM)	30.43	4.57	35.00
Soccer	(ROM)	19.08	2.87	21.95
Adventure Land & Pirate	(Cass/ROM)	30.43	4.57	35.00
Adventures 1 to 9 & 12	(Cass)	19.08	2.87	21.95
Adventure 10 & 11 (Joint)	(Cass)	23.43	3.52	26.95
A-Maze-Ing	(ROM)	19.08	2.87	21.95
Tombstone City	(ROM)	19.08	2.87	21.95
Zero Zap	(ROM)	19.08	2.87	21.95
Blasto	(ROM)	19.08	2.87	21.95
Blac/Jack Poker	(ROM)	19.08	2.87	21.95
Attack	(ROM)	19.08	2.87	21.95



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NEXT MONTH You only have to look at the cinema screens to realise that Fantasy rules OK. And in computer terms, this fascination with things escapist surfaces in adventure games, role playing aids like computerised dungeons and computer moderated gaming.

Next month, we give you some guidelines to setting up your own fantasy world on computer. We are also taking a longer look at computerised puzzling with some for you to solve.

Among the games listings are: Four-a-Side Soccer, Uranium Ore, The Croydon Blag* and a lot more besides.

*For those who aren't keen *Sweeney* and *Minder* fans a "Blag" is criminal terminology for a robbery.

SOFTWARE GIANTS CLASH

There is a storm brewing in the games software industry which could change the way you buy your discs and cassettes.

While **C&VG** does not usually involve itself in industry news or comment, this was one story we thought you should be told about.

The issue is software copyright and the adversaries preparing for legal battle are industry giants Atari and Commodore. The battleground for this test case is Pacman and the key question will be: Can you copyright an idea?

The background to this case involves Liverpool-based software house, Bug Byte who first brought Atari's software protection policy to everybody's notice when they felt forced to withdraw the Vic-20 cassette Vicmen which Atari had claimed was too similar to their licensed Pacman game.

Bug Byte produced a press release which claimed they did not feel they were infringing copyright but did not have the resources to fight Atari and its massive parent, the Warner Brothers Corporation.

Commodore does have the resources and when Atari threatened to sue the large U.S. microcomputer company over its Vic-20 cartridge Jelly Monsters, the lawyers were called in.

There is no software copyright law in Britain at the moment although there is in the U.S. and both the computer industry and the Government feels that software copyright is necessary and have set up committees to look into the best way to set out the laws. This test case may now save them the trouble.

The essence of Atari's case is that they hope to protect the innovative games designer and to ensure a higher quality of games software.

Arguments — sorry discussions — with writers from several software companies show that feelings run high on this subject and not all games writers want to be protected.

Atari usually take the part of the "Indians" in these discussions as a large corporation flexing its legal muscles.

Atari did not invent Pacman. The name Pac comes from the Japanese Pacu — meaning to eat — which shows its true origins. In the U.S. Pacman was the property of Bally Midway who produce the "official" arcade machines.

Atari bought the rights (licence) to put the Pacman name on the games cartridge for its TV games centre console — a name you can copyright over here — so other companies played safe by using names like: Super Glooper, Snapper, Vicmen and Jelly Monsters.

Atari bought its way into that success, others programmed their way into it. If Atari proves its case then games designers with innovative ideas will clean-up.

On the not so positive side, it may mean that some popular games may never find their way onto your type of home computer

My own feelings are that the software copyright tangle does need sorting out over here. And while Atari may be fighting the right battle to sort out that mess, they have chosen the wrong battleground.

The Atari VCS Pacman is a very different game from the one which everyone has been plagiarising.

As comment pieces go this is probably a little sit-on-the-fence-ish but I am reserving my opinions until Atari have had a chance to defend their decision to me.



Please drop us a line at: Computer and Video Games, EMAP, Durrant House, 8 Herbal Hill, London EC1R 5JB.

EXCELLENT ENGINEER!

Dear Sir,
I am the proud owner of an Atari 400 computer, and buy your magazine every month. The Engineer listing in the April issue proved to be a huge success with everyone who played it. The listing itself was easily keyed in, and error-free. Thank you to the writers and also to you for publishing such an excellent game.

I would like to expand my 400 to 32K, and could I ask you which (if any) Ramcard Ingersoll and Atari approve of. Secondly, could you tell me which programs you shall be publishing for Atari in forthcoming issues. Keep up the excellent magazine, and don't forget Atari.

David Mills
Rochdale
Lancashire

Editor's reply: Officially the machine was only intended to be expandable to 16K. However, Calisto Computers of 119 John Bright Street, Birmingham, B1 1BE produce and fit a board. For approximately £100 which will take your Atari 400 up to 32K.

FEATHERED FRIENDS

Dear Sir,
Just as I was beginning to despair of finding a regular microcomputer magazine which properly acknowledged the existence of the BBC micro, I wandered into our local newsagents and found your first issue of the OWL supplement. Of course I instantly pounced upon it and placed a permanent order for your magazine.

Having had my BBC Model A delivered only a few weeks ago and having had very little Basic experience before that, although we do have an ancient Pet at the office, I regret that I cannot yet think in terms of making a contribution to OWL.

In the meantime may I suggest that in the near future it would be useful to a lot of people if the tipster article could include some plain language explanations of some of the more obscure keywords in BBC Basic and their equivalents in other Basic dialects.

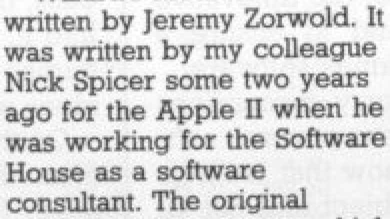
For example I get the impression that one uses one of the VDU commands in BBC instead of PEEK and POKE and although I'm presently still researching I'm not quite sure of some of the relationships.

Richard A Bates,
Exmouth,
Devon.

A WIZARD ADVENTURE

Dear Sir,
Would you oblige us by pointing out to your readers an error in the article by Keith Campbell headed Rooms at the Top in the March 1982 edition of your magazine.

Wizard's Mountain was not written by Jeremy Zorwold. It was written by my colleague Nick Spicer some two years ago for the Apple II when he was working for the Software House as a software consultant. The original version of the program which he wrote did not contain the bug which Keith Campbell mentions in his review. Who would try and compute the log of zero for a watch — only somebody who was copying the program and did not understand even how the program was intended to function.



Having said all this we feel that Wizard's Mountain is now rather "old hat" and feel that you may be interested in the hi-res 21 colour adventure for the Apple II which is currently under development.

Dick Williams,
South Croydon,
Surrey.

PRESTEL AND THE VIC

Dear Sir,
My VIC-20 and I have been very interested in your articles on Prestel. I already have a Beebox 40 Prestel graphics adaptor (e.g. 40 columns etc.) So what do I do now and how much will it cost?

Another thing which bothers me is, are the Telesoftware programs in Basic and if so what sort of Basic?

I don't see how a person with a Tandy using Prestel can use the same programs as a Commodore using a Prestel. Do you have to alter the programs for your machine?

Brett McBain,
Wisborough Green,
West Sussex.

Editor's reply: You're at least halfway there with the Beebox adaptor.

Your next need is some Prestel software and a box that will allow you to connect to the telephone.

A number of people are working on systems to do just this.

You could try and see if one of the Tantel Prestel adaptors can be connected to your system. The cost is about £150-£200. Telesoftware is machine specific — so you would only be able to download VIC software.

SOLUTIONS TO THE ZX . . .

Dear Sir,
In reply to D. McRiner of Shetland's letter, emphasising how, after a certain time, the unexpanded ZX81 will not EDIT.

I find that if the line to be EDITED is first LISTED, a following EDIT statement will carry out this function. For example if the line 570 is to be EDITED, key in LIST 570, after entering this enter EDIT and the command will be carried out.

Tim Hammonds,
Barnsley,
South Yorkshire

THE WISE OLD OWL?

Dear Sir,
Thank you for the very fair and perceptive review you gave my book **Let Your BBC Micro Teach You To Program** in the Owl supplement in September.

However, I would like to correct one slight inaccuracy. The price of the book is not as printed in your review. It costs £6.45.

Tim Hartnell,
Earls Court Road,
London.

WE SLIPPED A DISC!

Dear Sir,
I would like to point out a simple mistake you made in your September issue about disc drives for the ZX81. You proclaimed that there are no disc drives available for the ZX81 and none are likely to be developed. But . . .
Macronics is offering a drive and interface for the ZX81 for £160 which includes expansion motherboards and 2K Ram.

Kevan Thorn,
Dean Street,
Blackpool.

spectrum

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Meteroids	£17.35	Selection of Games	£6.91
Ghost Attack	£21.70	Selection of Utilities	£6.91
CASSETTES		Examples from Dragon Manual	£6.91
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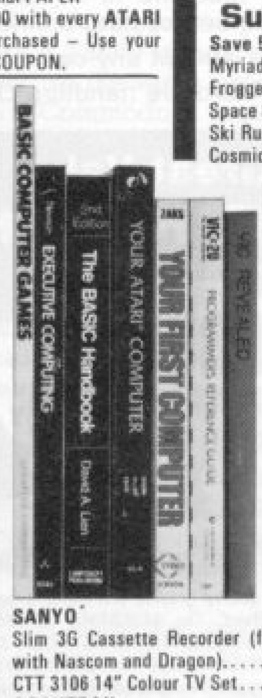
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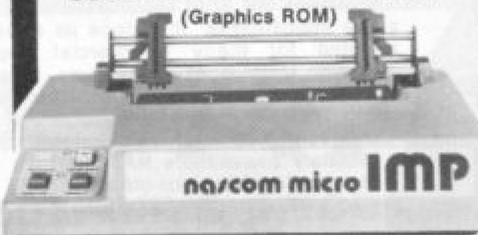
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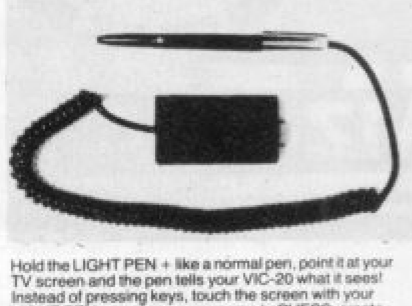
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QUOTES

"Michael Orwin's £5 Cassette Two is very good value. It contains 10 stolid well designed games which work, offer plenty of variety and choice, and are fun."
from the ZX Software review in Your Computer, May '82 issue.

"I had your Invaders-React cassette . . . I was delighted with this first cassette."
P. Rubython, London NW10

"I have been intending to write to you for some days to say how much I enjoy the games on 'Cassette One' which you supplied me with earlier this month."
E. H. London SW4

". . . I previously bought your Cassette One and consider it to be good value for money!"
Richard Ross-Langley, Managing Director, Mine of Information Ltd.

CASSETTE 1

(eleven 1k programs)

machine code:
React, Invaders, Phantom aliens, Maze of death, Planet lander, Bouncing letters, Bug splat.
Basic:
IChing, Mastermind, Robots, Basic Hangman.
PLUS Large screen versions of Invaders and Maze of Death, ready for when you get 16k.
Cassette 1 costs £3.80

CASSETTE 2

Ten games in Basic for 16k ZX81

Cassette Two contains Reversi, Awari, Laser Bases, Word Mastermind, Rectangles, Crash, Roulette, Pontoon, Penny Shoot and Gun Command.
Cassette 2 costs £5.

CASSETTE 3

8 programs for 16k ZX81

STARSHIP TROJAN



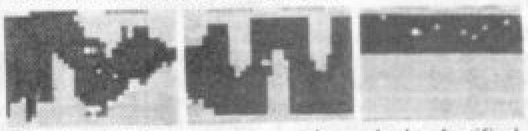
Repair your Starship before disaster strikes. Hazards include asphyxiation, radiation, escaped biological specimens and plunging into a Supernova.

STARTREK This version of the well known space adventure game features variable Klingon mobility, and graphic photo torpedo tracking.
PRINCESS OF KRAAL
An adventure game.
BATTLE Strategy game for 1 to 4 players.
KALABRIASZ World's silliest card game, full of pointless complicated rules.
CUBE Rubik Cube simulator, with lots of functions including 'Backstep'.
SECRET MESSAGES This message coding program is very txlp qexi jf.
MARTIAN CRICKET A simple but addictive game (totally unlike Earth cricket) in machine code. The speed is variable, and its top speed is very fast.
Cassette 3 costs £5.

CASSETTE 4

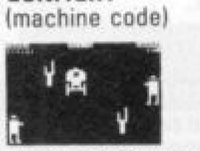
8 games for 16k

ZX-SCRAMBLE (machine code)

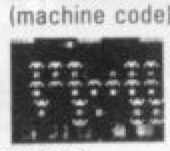


Bomb and shoot your way through the fortified caves.

GUNFIGHT
(machine code)



INVADERS
(machine code)



FUNGALOIDS (machine code)
GALAXY INVADERS (machine code)
Fleets of swooping and diving alien craft.
SNAKEBITE (machine code)
Eat the snake before it eats you. Variable speed (very fast at top speed)
LIFE (machine code)
A ZX81 version of the well known game.
3D TIC-TAC-TOE (Basic)
Played on a 4×4×4 board, this is a game for the brain. It is very hard to beat the computer at it.
7 of the 8 games are in machine code, because this is much faster than Basic. (Some of these games were previously available from J. Steadman).

Cassette 4 costs £5.

SPECTRUM SOFTWARE WANTED

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Michael Orwin, 26 Brownlow Rd., Willesden, London NW10 9QL (mail order only please)



TRANSLATING SPECTRUM

Dear Sir,
Please could you tell me how to translate the statement, "ON x GOTO . . ." into Spectrum Basic?
Simon Proctor,
Newport,
Gwent.

Editor's reply: ON x GOTO . . . can be replaced with the following, rather awkward expression when using the Spectrum.
IF x = 1 THEN GOTO a
IF x = 2 THEN GOTO b
IF x = n THEN GOTO . . .

EINSTEIN A-GO-GO

Dear Sir,
I was intrigued by David Langford's article, entitled Einstein-a-Go-Go in the May edition, of your excellent magazine.

In fact it was so interesting, I felt compelled to write. There were two points not fully explored which I found mentally frustrating. So I was wondering if you could help out — without becoming too technical.

Which cosmic law dictates that faster than light (FTL) travel is impossible. Surely anything which travelled FTL, in the universe would by its own speed, be invisible, and therefore very difficult to detect.

At the (velocity of light) C, a spaceship's mass would reach infinity. This may be so, yet if a spaceship could break the "light barrier", then would not all the laws be reversed at speeds in excess of C? Until finally, the spaceship became infinitely easy to propel. Also at such speeds what would the human eye see — if anything? Would light rays emitted from objects behind the spaceship, not be able to reach it? Thus giving the impression of a void, behind.

Vision would be cut by 50 per cent, only being able to see objects in front of the spaceship. Also the objects off to the side, will they be seen where they are, where they have been, or where they are going to be? So foreseeing the future!

The article said that it would take 10,000 years to travel across the galaxy. This seems to indicate that there is an edge to the galaxy. If this is so, what is beyond that edge? Perhaps another galaxy. But surely even galaxies must end at some discernible edge? What exists beyond that edge?

People once believed the earth was flat, this of course was not true. What shape is the galaxy or galaxies, or is man's brain not old enough to comprehend, only to question?
R. M. Cooper,
Halifax,
W. Yorkshire.

David Langford replies: To answer all the questions here would take a whole book! One such book is *The Science in Science Fiction* by Peter Nicholls, Brian Stableford and myself, to be published by Michael Joseph later this year. The Pelican *Relativity for the Layman* is also worth a look.

Einstein's well-tested Special Theory of Relativity predicts that we can never travel faster than light since our spaceship's mass would swell to infinity as we approached velocity *c*. We'd need infinite energy, infinite fuel, to accelerate to *c* let alone faster.

But there may possibly be particles called tachyons which 'naturally' travel faster than light: the equations say the mass of a tachyon would be an *imaginary number*, implying either that they don't exist or that they can't in our universe. Worse, it's quite clear that it would take infinite energy to *slow* a tachyon to less than *c*: the 'light barrier' is impassable from both sides.

Mathematicians have even worked out that from the viewpoint of a tachyon creature, it's we who would seem to be travelling faster than light — *we* would seem inaccessible beyond the light barrier.

The general opinion is that something travelling FTL would exist (if at all) in a different "tachyon universe" beyond any hope of detection — both invisible to us and unable to detect us. This is just as well, since most of present-day physics would fall apart if it were possible to outrace light and effectively peep into the future!

Finally, the cosmological questions. Our galaxy is a multiple spiral of stars around 10,000 lightyears across; light takes about 10,000 years to travel



across it and our slower-than-light spaceship must always take a little longer.

There are very many more galaxies, out to as far as our telescopes can see.

Now hold onto your hat: we believe there's a limit to the number of galaxies all right, but also that there's no edge. The *General* Theory of Relativity shows that space is curved through four dimensions in the way that the Earth's surface is curved through three. And, just as if you tried to reach the edge of the Earth, a long enough journey would take you right round the universe and back to where you started.

THE WONDER OF GRAPHICS

Dear Sir,
Now that I have discovered your excellent magazine, I have developed an even greater interest in computers. I do not yet own one of my own, nor have I ever seen any of the more sophisticated games played on a home computer. So being naturally curious, I wonder if you wouldn't mind answering a couple of questions for me.

First of all, is it possible to achieve the same degree of definition and speed of graphics on a home computer as on a good dedicated games machine such as the Atari, Philips or Intellivision?

I understand that the computer executes statements *one at a time* in numerical order (except for loops and jumps), so how is it possible to have dozens of objects all moving on the screen simultaneously, such as in Space Invaders or Galaxians?
Mr A A Birch,
Penrith,
Cumbria.

Editor's reply: Your home computer, with some decent software should be able to give you better definition and animation than a dedicated games machine. Most good games use machine code — which is about 10 times faster than programs written in Basic. Even when using Basic the speed of execution is fast enough to fool the eye!

BASIC WORDS OF WISDOM

Dear Sir,
I've had your magazine on order since the first issue, and think it is the most useful and interesting magazine out.

I'm writing to see if you can help me with the Peek and Poke locations on my computer. I have a TRS-80 Level II, and do not know many of the useful locations in the Basic Vectors on it.

I know about the keyboard scan locations, but can you recommend a book (other than TRS-80 Assembly Language Programming), which will have these locations in?

I am also doing machine language programming, so any of the Rom subroutines (such as the random number generator) locations would also be appreciated.
Andrew Wright,
Walsall,
West Midlands.

Editor's reply: A good book to look out for is 'More TRS-80 Basic' by Inman, Zamora and Albrecht. But the book you quoted, 'TRS-80 Assembly Language' by Howe is still the best introductory publication.

WORD OF THE KSIFFCHI

Ksiffchi are blue-furred marsupials, with a capitalist economy and a liking for alcohol. In other words, they are typical merchants.

This description comes courtesy of Marcus Rowland, the Ksiffchi's human mentor, who is currently guiding them through *C&VG*'s Starweb game.

By now, the game should have progressed sufficiently for these early comments on Ksiffchi tactics not to affect their aim to become the dominant force in the known galaxy.

Harken then to the words of the Ksiffchi as translated by Marcus . . .

Had I realised that you could play Starweb in England, I might have signed on years ago. Within a few weeks of winning my rule book, the first printouts arrived and confusion set in.

The printouts are meaningless without the rules, since each world has a coded situation report on population, resources, industries, military status, and a host of other information. It takes a lot of study to understand what's happening.

The competition game made things easier by pre-generating the first two turns, in which my race (now called KSIFF by Starweb's economical computer) expanded to 10 solar systems. In the third turn I started to write orders, deciding to expand my empire by sending fleets and probes to neighbouring systems while consolidating defences in the inner systems. I had a feeling this might soon be necessary.

In the fourth turn I encountered three other empires, and one of my worlds' defence forces ambushed another player's fleet. I don't know what is going to come of these encounters, but suspect that my defence work was a wise move.

As things stand, then, my position is rather interesting, since my score is relatively low and my empire is still underdeveloped.

I hope my moves this turn will rectify this situation, if not I'll try to go down fighting. The next few turns should be fairly decisive.

BRAINWARE ANSWERS

T	V	G	A	M	E	S	C	E	N	T	R	E
I		H				L				I		D
M	O	O	N	S	H	O	T		E	M	A	P
E		S		P		T		F		E		
S	E	T		E			S	U	B	S	E	T
W			S	C	A	N		E		E		H
O	L	D		T		O		L		D	I	E
R		O		R		T	U	B	E			P
D	I	G	D	U	G			A		A	I	R
		G		M		M		S		T		O
R	O	O	M		F	I	R	E	D	A	R	T
E		N				N				R		O
S	P	E	C	I	F	I	C	A	T	I	O	N

The solution to September's Nevera Crossword is printed above. But our September Mind Routines was more tricky than usual. The figure in the "H", "N" box should have been a "4" and not a "2". So we have extended the deadline by two further weeks on this. Entries by 1 October please.

More Brainware on page 82.

Winner of our August Mind Routines problem was Mr S. Templer, of Hayes, Middlesex. The crossword winner was Mr A. Doherty, of South Ascot, Berkshire.

WINNING DAYS

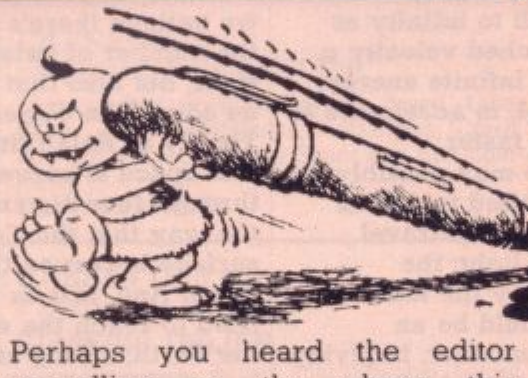
Our hoped-for Tron competition has had to be put back an issue because of space pressures — the publishing kind, that is.

But we hope to bring it to you next issue. November also sees the introduction of a competition so different that it is going to take us three issues to get it going.

A unique competition has come to our attention. Portsmouth-based Automata is producing its own version of the successful "*Masquerade*" puzzle. Pimania is the name of this adventure type game and Automata is putting up a prize valued at £6,000 for the first person to solve it. More details next month.

For the last word on competitions this issue, don't forget to let us know the best game we have published for your computer, since we launched.

Your votes could influence the Games Designer of the Year competition we have been running over the first 12 issues. A trip to Paris is at stake.



Confessions of a Bug

Perhaps you heard the editor grovelling on the phone this month . . .

"No I'm terribly sorry, it's a complete mystery to us . . . we had it working in the office just before we listed it . . . I think someone must have sat on the keyboard . . ."

YUK! Pathetic creature. Anyway the truth is that Mini Defender was a Screaming Foul-up special. We don't let him out much these days. But when we do . . .!

The offending lines are as follows:

40 LET B$(E) =C$
70 FOR E = 9 TO 2 STEP −C
200 NEXT B

One line which wasn't even graced with a line number was 80 which got mixed up with line 70. It starts at: PRINT AT D,D; and continues until the end of that line.

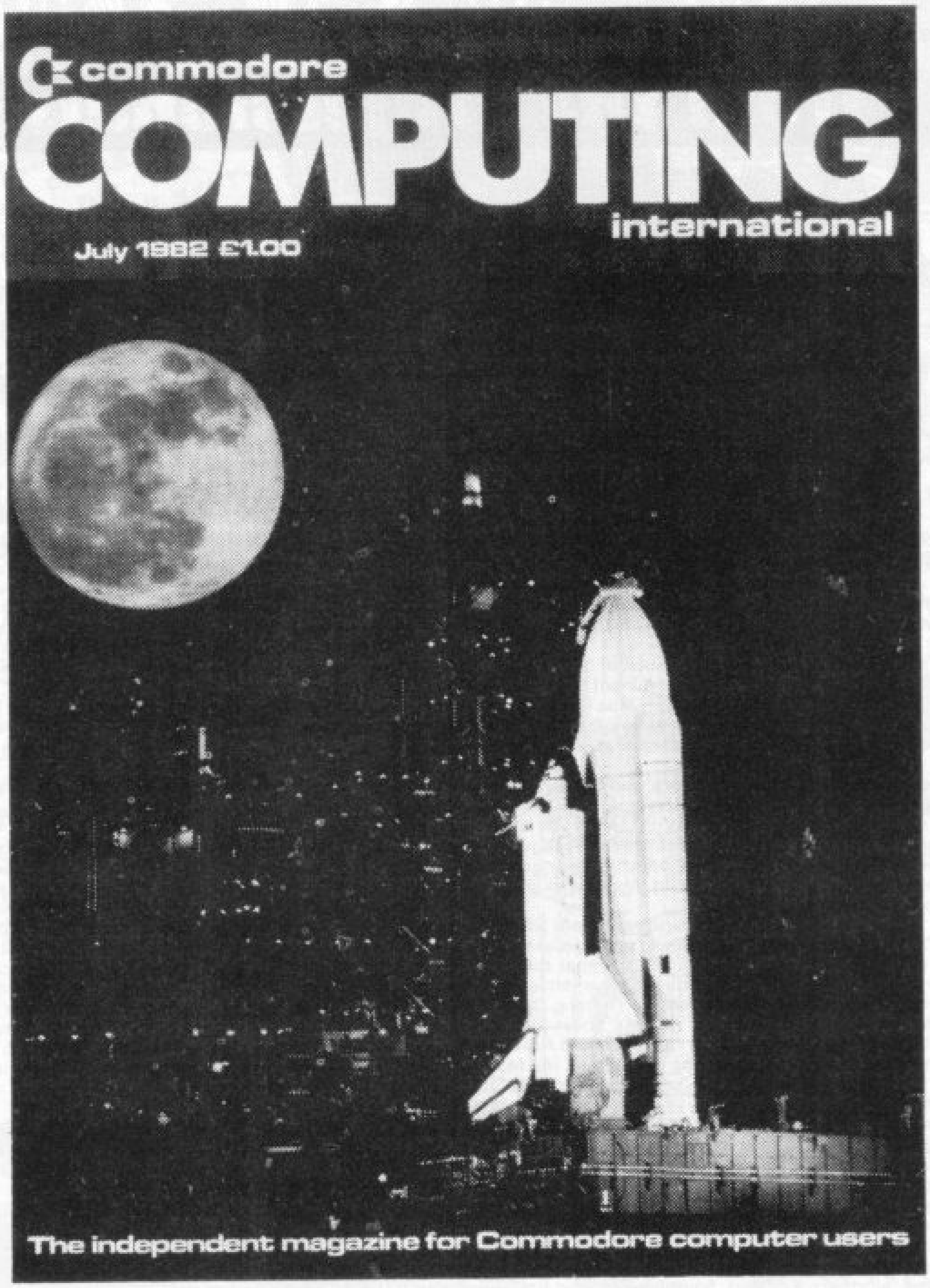
Martian Explorer (August) had more of T. Hitch's subtlety about it: line 4115 is a clear screen command and lines 4130 and 4140 contain a no. of graphics characters in inverted commas. Type in the following with the CTRL key depressed.

4130 ? "FUEL (8 spaces) 0 ZRXRXRXRXRXRXRXRXRXRZ 100"
4140 ? "SPEED −60 ARSRSRSRSRSR *SRS* RSRSRSRSRA 60"

The central SRS should be printed in inverse video.

Several enquiries about Bomber last issue but we never touched it. If in difficulties check your "I"s and "1"s.

An exciting new Commodore peripheral



Own or use a Pet or a Vic?

Fed up with being ignored by all the traditional monthly magazines?

Fed up with listings, which are too simple or simply do not work?

You need *Commodore Computing*, the new monthly magazine. *Commodore Computing* is published by Nick Hampshire, author of *The Pet Revealed, Pet Graphics, A Library of Subroutines* and *The Vic Revealed.*

Each issue is packed with advanced advice on how to make the most of your computer, whether you use a Pet or a Vic.

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MAL FUNCTION
T. HITCH
SNAG JNR
SCREAMING FOUL UP
THE BUGS
THEY'RE AFTER ME ··· GOTTA HIDE SOMEWHERE · ·· PHEWW!!
THE BUGS' PROGRAMMER IS GRIPPED BY THE LATEST PIECE OF SOFT-WARE IN HIS LIBRARY
Super Duper PAC GLOOPER
PHEWW!!
MEANWHILE INSIDE THE MICRO··
RATTLE!
NEVER MIND THAT. GRAB A SEAT!
WE'VE GOT TO GET SOME DOUBLE GLAZING!
TECHNODRAC PRODUCTIONS PRESENT THE FURTHER ADVENTURES OF
PACMAN
FLICKER! FLICKER!
FIVE SCREENS I'VE EATEN AND STILL THEY ARE AFTER ME!
I DON'T SUPPOSE YOU GUYS HAVE SEEN A LITTLE·· ····
I'LL JUST EAT MY POWER PILL AND ···
SSHHH!
THE END
WORTH AN OSCAR!
TYPICAL MICROWOOD SLUSH, BEARS NO RESEMBLANCE TO REAL LIFE!!
HE'S STILL SICK AS A DOG AFTER THAT LAST SCREEN HE ATE !!!

NEW PRODUCTS NEW PRODUCTS NEW PRODUCTS NE

GAMES NEWS

AMERICANS SEND IN THE ALIENS

ZENITH

A dual sensation of flight and speed are the two key attractions in a new 3-D space game from America called Zenith.

Your mission: defend the new space city which is being constructed to house the inhabitants of the old galaxy. The aliens are attacking. Spiralling towards you in colourful geometric shapes.

You wrestle with the joystick in an attempt to keep your ship steady, and get the aliens in your gunsights — as the chequered ground sways to and fro, zooming past beneath you.

Zenith is one of a new series of games for the Apple II from the new American software house Gebbelli. The game is sold in this country by S.B.D. of Richmond at £21.50, together with the two other space games — Lazer Silk at £18.00 and Phaser Fire at £18.50.

Also new from S.B.D. this month is an insect war game called Fly Wars.

You are a spider crawling around the screen weaving a web, when suddenly you are attacked by a variety of pests. Fly Fighters can be easily trapped in your web.

Fly Wars runs on an Apple II in 48K and is available from S.B.D. at £17.95.

DEATH LURKS BENEATH THE WAVES

BBC POLARIS

A watery grave awaits you if you do not sink the enemy fleet that is advancing on your submarine at a rate of several knots.

"Up periscope" you scream at a trembling crewman, survey the horizon to spot two carriers complete with jets, depth charges, and anti-submarine helicopters.

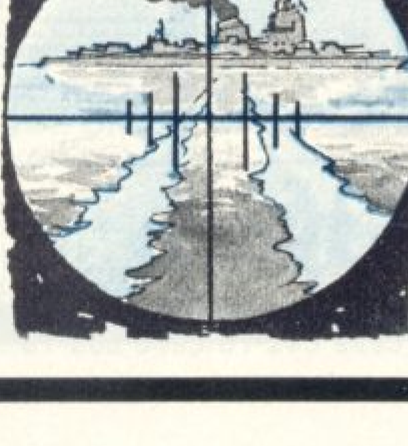
The enemy ship is in range of your heat seeking missiles. You must give the command. It's kill or be killed. But can you do it?

All those hours spent at the simulator at naval school flash through your mind. You must have downed dozens of ships there every afternoon. But then that was just a game — this is the real thing. You pull yourself together and blurt out the vital command "fire".

BBC Polaris simulates the action of a sea battle with you as the captain of a Polaris submarine. The game runs on the model B, and costs £8.00 from Liverpool based Bug Byte.

Space Pirates is an Asteroids-type game in which you must protect your supply of space eggs from a relentless onslaught of meteors and alien ships. The game runs on the BBC model B and costs £8.00 from Bug Byte.

Budding chess supremos will welcome this latest addition to the Bug Byte range of games for the BBC computer. The game features a high resolution display of the board in full colour. It has a quick response on the lower skill levels, enables you to set up chess problems and retain games on tape. Chess costs £11.50 from the Liverpool firm.



WE TAKE MORE CARE OF YOU!

JUMBO

Pilot a Boeing 747 on a trans-Atlantic flight from Heathrow to Kennedy airport in New York without leaving your front room.

This flight simulation game is based as closely as possible on the actual controls of a Jumbo jet. You have a choice of six destinations in the UK and six in the States.

Molimerx say they are selling more copies of this game than of any other game they have ever sold.

The game runs on a TRS-80 or a Genie 1 or 3 and it costs £15 plus VAT from the Bexhill-on-Sea based firm.

Also new from Molimerx this month is an underwater sea battle game in which you captain a submarine and attempt to sink the enemy fleet which is bombarding you with depth charges from the ocean surface.

Seawolf runs on a TRS-80 or Genie 1 and 3 at £8.75 plus VAT.

War gamers will welcome a return to the eleventh century in a battle between the Saracens and the Crusaders also available from Molimerx at £11.75 plus VAT and runs on a TRS-80 or Genie 1 and 3.



INVITE THIS BANDIT INTO YOUR HOME

CASINO

Tired of walking to work when you have put your last 20p in the fruit machine down at your local?

Here is a way to kick the habit gradually with a fun version of the seaside pier favourite which offers you all the excitement of the real thing, but is a lot easier on your pocket — and your feet.

The game produces the three wheels on your screen which spin when you tap the appropriate key. The wheels stop one after the other and feature all the fruits, bells, and crowns of a normal one armed bandit.

Card sharks will also enjoy the pontoon game which is featured on the B side of this cassette.

Casino runs on a ZX81 and is available at £2.50 from A. Stoke, Harrogate, Yorkshire.

ENCOUNTERS OF THE NASTY KIND

METEOR STORM

There are close encounters of the dangerous kind in this latest game for Sinclair's new baby.

Two different types of flying saucer and a bombardment of meteors are featured in the latest Asteroids type game for the Spectrum.

The game features thrust, fire, and hyperspace - moving left right on the keyboard thus re-creating the principle features of the arcade version.

You also get a personalised score read out at the end of the game and a hold facility.

This enables you to make a cup of tea or answer the door, and then take up the game where you left off when you are ready to take on the aliens again.

The game also talks to you utilising the standard sound capabilities of the machine.

Meteor Storm is the latest game from Southampton based Quicksilva in the race to produce games for the Sinclair Spectrum. The game can be purchased from Quicksilva at £5.95 inclusive.

GAMES NEWS

JUST WHEN YOU THOUGHT IT WAS SAFE!

BBC INVADERS

Having colonised just about every microcomputer on the market those power mad Space Invaders are on the offensive again — this time gunning for the BBC model B.

These Invaders have learnt a thing or two from previous campaigns — namely the ability to fire missiles diagonally, as well as vertically. They can also move at six different speeds, and fire missiles at three different speeds, depending on the skill level you select.

Experienced Invader duallists will enjoy the fleet advancement feature on this game which cause the fleet to jump down the screen each time you go onto a new fleet.

The game gives you a comprehensive score and performance read out at the end of each game. You are told how many ships you hit, and their types. The number of shots fired, and your percentage success.

BBC Space Invaders is available from Leeds based Program Power at £6.95 plus VAT.

Also new from Program Power this month is Astro Navigator, a game in which you must navigate your space ship through a series of undulating caverns full of giant mice whose main aim in life is to stop your ship and eat its inhabitants.

Astro Navigator runs on the BBC model B and costs £4.95 plus VAT.

THE LIGHT FANTASTIC

LIGHT PEN

Light pen games are becoming increasingly popular especially with younger users. An electronic pen enables you to locate and then move characters on the screen — for example chess pieces or the counters in the game Go.

A light pen for the VIC-20 is manufactured by Stack Computers of Merseyside. It costs £25.95 plus VAT and comes complete with an instruction manual and a free copy of the card guessing game Concentration.

Other games from Stack to be used with the light pen are Backgammon, Life, Solitaire, Draughts, Othello, Go and Ludo. These family favourites all come on cassette for the VIC-20 and cost £5.00 each.

COMMANDING YOUR OWN BATTLE ZONE

TANK ATAK

Tank Atak puts you at the controls of a tank deep inside enemy territory.

From your screen mounted gunsight you can see enemy tanks, planes and flying saucers appearing from a range of hills in the distance. You must shoot these to score points but beware of their return gunfire which can destroy your tank in a split second.

Games players familiar with the arcade game Battlezone will welcome this addition to the software range available for the VIC-20. The game is a plug-in Rom cartridge and is available at £24.99 from Reading based Audiogenic.



SOLVE THE SECRET OF THE SPHINX

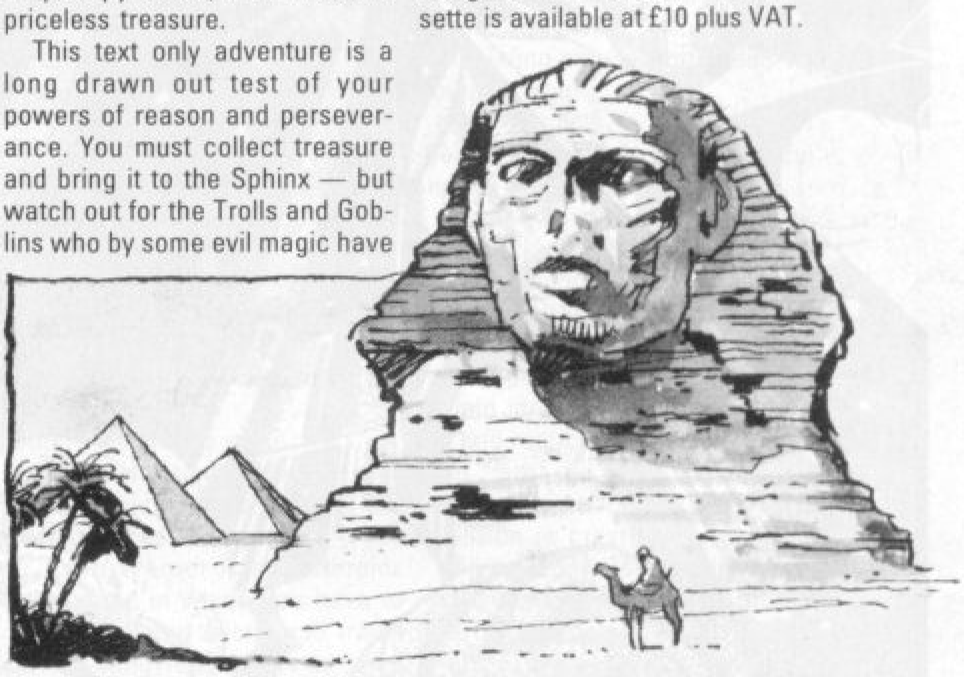
SPHINX ADVENTURE

Sphinx Adventure takes place in ancient Egypt against a back drop of pyramids, mummies and priceless treasure.

This text only adventure is a long drawn out test of your powers of reason and perseverance. You must collect treasure and bring it to the Sphinx — but watch out for the Trolls and Goblins who by some evil magic have been brought to ancient Egypt to fleece you of your treasure.

Sphinx Adventure runs on the BBC model B and is available from Cambridge based Acornsoft at £8.65 plus VAT.

Also new from Acornsoft this month is a four game pack for the BBC model B. Arcade Action features four popular arcade games — Invaders, Breakout, Dodgems and Snake. The cassette is available at £10 plus VAT.



MEET THE HAPPY EATER

THE GLUTTON, MOON LANDER

Those greedy electronic termites of the arcades are at it again. This time they have munched their way into the Sharp MZ-80K in a new Pacman type game called — appropriately enough — Glutton.

The Glutton is guided through the maze using four keys which move it up, down, left, or right.

The Glutton's aim is to gobble up all the dots in the maze and then start eating his way through the next one.

This new screen will appear as soon as he has eaten all the dots.

Just as in the arcade version, the ghostly quartet of creatures Inky, Blinky, Pinky and Clyde are hot on your little Glutton's tail. They are as anxious to eat him as he is to eat those dots.

Also new for the MZ-80K is a space game called Moon Lander.

This game is based on the time-honoured Lander tradition. You have to land a space ship on a barren and rocky planet before you run out of fuel and crash. Glutton and Moon Lander are available from Sharpsoft of London. Each cost £5.85 including VAT, postage and packing.


IF THE CLOUDHOPPERS, WASPS, SPIDERS, METEORS, OR SATELLITES DON'T BEAT YOU...
...RENAISSANCE WILL
CLOUDBURST
meteor run
Renaissance
SPIDERS OF MARS
satellites and meteorites
5 More great VIC Cartridge games from Audiogenic

GAMES NEWS

SPACE AGE VERSION OF THE STING

SWARM



The ultimate science fiction horror theme comes to computer games.

A queen bee is an uninvited guest on board an Interstellar space shuttle. Near Kroton — the fifth moon of the planet Zarg, an alien energising gas enters the ship through a damaged retro-rocket. The humanoids on board are shielded from the gas by their helmet purifiers — but not the bee.

You arrive on the scene as a queen bee the size of a Harrier jump jet appears at the top of your screen. She immediately starts laying her eggs in a long snaking cocoon moving right and left across the top of your screen. Armed only with a laser base you must shoot accurately and shoot fast before the super-bees hatch out and swarm towards you.

Once they start swarming their giant stings become difficult to avoid as they rain down from above. You have three lives with a bonus life for every 1000 points scored — points are awarded for the number of bees downed.

Swarm runs on the Acorn Atom in 12K and costs £4.95 plus VAT from Leeds based Program Power.

Also new from Program Power for the Acorn Atom is a Dogfight game. The action takes place in the middle of the ocean — both planes operating from off aircraft carriers. The object of the game is to shoot down your opponent before he shoots you.

There is also a Stock Car race game which offers you 16 different tracks to negotiate.

Astro Warrior is an Asteroids type game in which you have to shoot assorted aliens and travel to far flung fuel dumps to keep your craft moving.

Dogfight, Stock Car and Astro Warrior run in machine code for the Acorn Atom 12K and can be obtained from Leeds based Program Power at £4.95 plus VAT.

WATCH OUT, ALIENS ARE ABOUT!

3D DEFENDER

Seated in the cockpit of your Defender ship you'll witness alien attackers, meteors, and scintilating clouds flying head-on towards you.

The ground is also not far below and you must be careful not to crash into the hills.

Armed with photon torpedoes you will score 250 for each direct hit and 50 if you fly low enough to entice an alien to attack you. As the alien onslaught proceeds you must be cautious to keeping your shield strength — set initially at 10 and reduced by one each time you are hit by plasma or meteorites, and by two for a collision or crash landing.

Flying controls include a forward radar screen which shows you what to expect to find in view a few seconds hence. A "proximity warning' tells you about imminent alien craft.

This 3D Defender cassette is available from the Bath based firm J. K. Greye and runs on a Sinclair ZX81. It costs £4.95.



ALL THE FUN OF THE FAIR

SHOOTING ARCADE

All the fun of the fair ground on offer in Shooting Arcade one of three new games from America.

You move your gun with a joystick or using the keyboard and then take potshots at the stampeding elephants, waddling ducks, and jumping bunnies.

Bonus points are awarded for hitting smiling faces. But don't mistake a smile for a frown — for if you hit a frowning face you bullets will turn to blanks.

Shooting Arcade has been imported by Hertfordshire-based Audio Video Offers for the Atari 400 and 800. The other two titles from the U.S., Pacific Coast Highway, and Clowns and Balloons are, like Shooting Arcade, available as either a 16K cassette or a 32 disc version; all games and formats costing £20.50 each, inclusive of VAT.

PIRATE WITH A VAST EVIL ARMY

WINGED AVENGER

The Winged Avenger has countless Drones and an Invasion Froce to send out to do battle with you before he is drawn into the fight himself.

The Drones attack relentlessly and their purpose is to soften you up for the more superior Invasion Force. The Invasion Force are the elite of the fleet — and they will fight on to the very end, often necessitating more than one direct hit.

The Assailants also attack in three waves and combine a tendency to fly direct at your missile base — Kamakazi style — with very heavy fire power.

You have limited energy to fire your laser, which is capable of rapid fire, and to power your base shield which will protect you from flying debris and from those of your opponents who wish to die in a blaze of glory by crashing into your laser base.

If you survive these attacks the Winged Avenger must concede that you are a worthy opponent and will engage you himself.

He is armed with powerful Smart Lasers that lock onto your base and are guided for the kill.

Your only hope of vanquishing this seemingly unbeatable space pirate is to damage his central control and force him to withdraw.

Winged Avenger is based on the popular arcade game Phoenix and runs on a Sinclair Spectrum. The game is available from Luton based Work Force at £6.95 inclusive.

Read this ad

You: "Darling, I've decided to buy a computer."

Her: "***++**??!!***@XX??££**??!!? off!"

You: "Yes, I know we could do with a new washing machine. But the new Dragon 32 Computer is much more important. It's the first computer actually designed for all the family - and it costs under £200!"

Her: "***++??!!@££??! fortune!"

You: "No, I'm not being selfish. Computers are for the whole family - and they're going to play a big part in the children's future."

Her: "Oh?"

From this point on, the conversation should follow more reasonable lines. Allowing you to fully explain the many advantages of the new Dragon 32 family computer.

32K RAM FOR UNDER £200.*

For a start, the Dragon offers 32K RAM. Your wife may not understand that, so just tell her that the Dragon's capabilities are truly massive - at least twice as powerful as its competitors, with some features you won't find even in more expensive units. The Dragon will give you all the power you're likely to need, and more, to create your own programs - along with an exciting range of software which can do anything from helping with kids' spelling and arithmetic to creating your own cartoons.

THE FIRST FAMILY COMPUTER.

All of which brings you nicely to the point where you tell your wife just how much fun the kids will have with the Dragon. How it will save her all that

*Television not included in price.



money on those Space Invader machines. How it will magically translate simple typed instructions into beautiful drawings and designs using set, line, circle, draw, scale, rotate and paint features, in up to 9 colours - and play and compose

to your wife.

SPECIFICATIONS
6809E MICROPROCESSOR. Pet, Apple, Atari 400, BBC Micro, and VIC 20 still have the less powerful 6502.
32K RAM (as standard). At least twice the power of similarly priced machines. Expandable to 64K RAM.
EXTENDED MICROSOFT COLOUR BASIC (as standard). Featuring: ADVANCED GRAPHICS (set, line, circle, paint, print, draw, rotate and print using). ADVANCED SOUND 5 octaves, 255 tones. AUTOMATIC CASSETTE RECORDER CONTROL. FULL EDITING with INSERT and DELETE.
9 COLOUR, 5 RESOLUTION DISPLAY.
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JOYSTICK CONTROL PORTS.



with 5 octaves of music. How it will engross your children in mind-boggling adventures in dungeons and caves without even getting their knees dirty. And the Dragon works with any U.H.F. TV.

THEY'LL LEARN AS THEY PLAY.

And then you can casually point out that although the kids are having fun, they're also learning. And within a very short space of time, the whole family will be completely at home with programming - with computer language - with every aspect of how computers work. Which can't do their future prospects any harm at all.

BRILLIANTLY SIMPLE INSTRUCTION MANUAL.

The Dragon is made in Britain, designed with the help of British Universities. And it's also worth remembering that the Dragon's instruction manual is clearer and easier to understand than any other home computer's.



That its top-quality keyboard is as easy to use as a typewriter, and so well made it's guaranteed for twenty million depressions.

TAKE THE FAMILY DOWN THE HIGH STREET.

And if she still wants to know more, take her to see the Dragon 32. It'll soon be available in most good stores - or you can send the coupon for further details.

And if you're one of our many lady readers, please accept our apologies.

Perhaps you'd like to read this ad to your husband.

DRAGON 32
The first family computer.

To: Jean Webster, Dragon Data Ltd., Queensway, Swansea Industrial Estate, Swansea, Glamorgan SA5 4EH.
Tel: 0792 580651.

Please send me further information about the Dragon 32.

Name ____________________

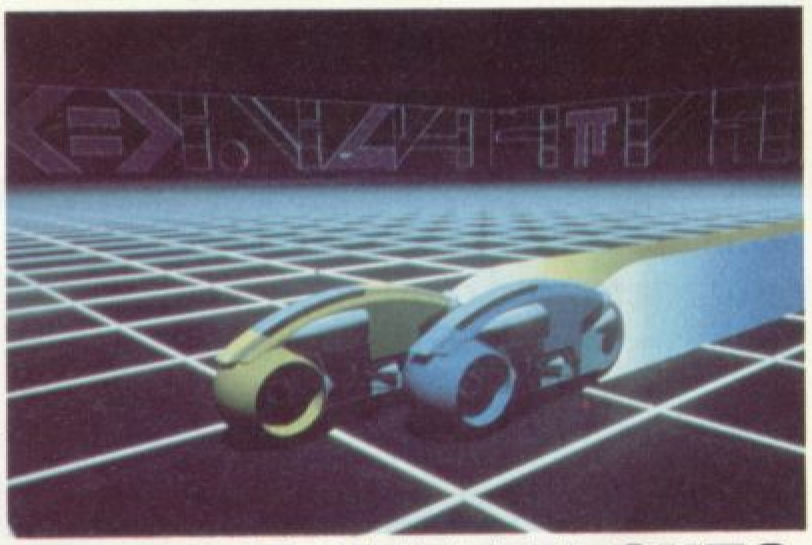
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Walt Disney Productions

BIZARRE HEALTH CUTS

MICRO SURGEON

You will finally be able to put that Biology O-level to good use when Imagic launches its bizarre game Micro Surgeon over here.

The patient is critically ill and the game challenges you to undergo a *Fantastic Journey* type mission into the bloodstream to save him.

Inside the patient's body, you navigate your way through the bloodstream, out-manoeuvring white blood cells that attempt to destroy you as foreign matter.

Your mission is to remove a tumour from the brain, a blood clot from near the heart and nicotine deposits from the lungs. But you must work fast as the patient will die within an hour if the operation is not complete.

Micro Surgeon is one of five exciting releases planned around Christmas time by the U.S. company Imagic through its distributors over here, Adam Imports. These four run on the Mattel Intellivision and go alongside a range of seven Atari compatible cartridges.

Apart from Micro Surgeon there is a version of the popular arcade game Donkey Kong, where you have to scale the outside of a skyscraper to rescue the girl from the clutches of the giant gorilla who is threatening to throw her off.

Just to make things a little more difficult the gorilla also has an inexhaustible supply of boulders which he is tossing down at you. You have to dodge these or, if you're brave enough, squash them to score bonus points. The player that gets to the top and rescues the girl in the quickest time is the winner.

Swords and Serpents places you in a maze-like dungeon where you have to do battle with Black Knights, dragons, gargoyles, and an army of enemy Knights.

You are befriended by a wizard who you take under your protection until he learns the spells that may help you both escape with the treasure that litters the dungeon.

Demon Attack is a fast and furious space attack game based on the popular arcade game Phoenix.

Atlantis — that mythical city under the sea is under attack from alien spacecraft.

Armed with a single laser gun you are charged with the task of resisting the alien onslaught.

THE WORLD OF TRON

TRON GAMES

With Tron the movie playing to packed audiences across America and soon to open in the UK — TV games centre owners may soon be able to enjoy some action on their own television sets.

First in the field are Mattel with two Tron-based games for their Intellivision machine.

The games are based closely on the storyline of the latest Walt Disney production.

In Deadly Discs you do battle with a variety of computer controlled adversaries who chase you across a black grid. You are armed with an electronic frisbee — disc which you fling at your opponents — just as in the film. If you score a hit your enemies will disintegrate.

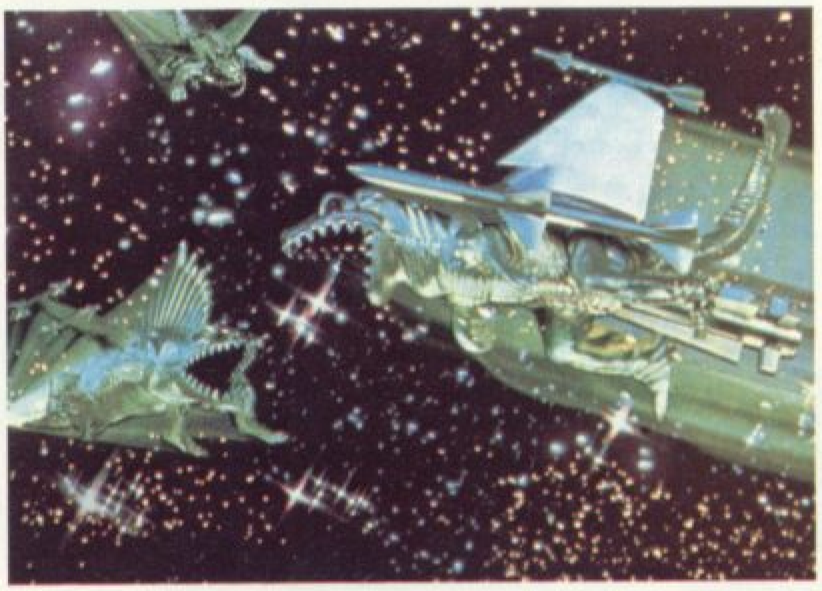
In Tron-Maze-A-Tron you must penetrate the Master Control Programme, again just as featured in the film script. Sark — the evil overlord of the computer will attempt to thwart you, sending out adversaries of "the most grotesque kind".

Six other games for the Intellivision machine have now been in the shops since the Summer: Space Hawk, Lock n' Chase, Utopia, Frog Bog, Sub Hunt, and Night Stalker.

Worthy of a particular mention among these is Lock 'n' Chase — Intellivision's answer to Pacman.

The game seemed a little slow by comparison with Atari Pacman and the Intellivision direction disc makes steering more difficult than with a joystick but the lock feature more than makes up for this.

It enables you to lock off sections of the maze by placing a little red bar behind you in the maze to foil — just as your pursuers home in on you.



WINGED WARRIORS

DEMON ATTACK

The demons are attacking the ice planet of Kybor.

Armed with a laser cannon you must defend the planet's freezing surface from the demon fire which is being showered down on you from the eerie creatures hovering above.

Points are scored each time you successfully blast a demon out of the sky.

You are also awarded an extra laser cannon for each wave of demons you manage to survive. The value of the demons increases as you go onto the next wave — up to the 12th wave when Demons are worth 35 points, Split Demons 70, and diving demons 140. From this stage onwards the points remain the same.

The Demon Attack cartridge gives you ten games in all to choose from — some for one and some for two players.

Games 1, 3, 5 and 7 pit you against progressively more difficult waves of demons.

The higher the game number — the faster and more skilful the demons become.

Games 2, 4, 6 and 8 are two player versions of the above — play alternating between both players. Tracer shots are also featured in the two player versions.

Demon Attack is manufactured by Imagic for the Atari VCS and will be in the shops in October.



RIBBIT, RIBBIT!

FROGGER

The trip to the breeding grounds is life and death to the hopping amphibians of Frogger.

A busy highway and a perilous river crossing stand in their way and they have only 30 seconds to reach the home bays.

Frogger is the second cartridge in the range of Atari compatible games from Parker Brothers to be available over here and it is a very close copy of the arcade original.

Each frog must be guided through five crowded lanes of traffic, hopping between cars and lorries, travelling in different directions at varying speeds.

Then he arrives at the river bank and is faced by a raging torrent, carrying logs downstream while turtles swim up it. By judging leaps between these he will arrive at his home bay.

But our aquatic leaper must take care not to spend too long on the blue, diving turtles which will dip below the surface and surrender him to the current. On the bright side he could rescue a lady frog from the logs and carry her home on his back.

Alligators drift between the logs and their jaws will snap shut on any frog careless enough to leap into them.

Points are scored for every frog safely home and bonuses for those who picked up a lady friend or found a tasty fly meal.

When all five frog bays are filled a set of new frogs come out to make the trip — only across more crowded roads and with fewer floating objects on the river. But watch out for snakes and alligators on the river banks in the later stages.

Palitoy markets the cartridge over here and it costs £29.50.

NOW-SOUND AND VISION

SPACE SPARTANS

Space Spartans and B17 Bomber feature the new Intellivoice speech reproduction system which reproduces voices fairly realistically.

The Intellivoice Voice Synthesis Module plugs into the cartridge slot on the Master Component and then the special Intellivoice cartridges plug into this. The speech box costs £69.95 from Intellivision stockists.

The battle computer — which is the speaking part of the game Space Spartans — tells you how you are progressing and warns of any imminent aliens.

Of the new games available for the Intellivision machine Star Strike was the one that stood out from all the others at a recent Mattell toy fair.

It's 3-D graphics are both colourful and vivid. Alien ships buzz around you as the planet earth moves slowly across the screen — within range of the alien missiles.

Intellivision cartridges are available from good toy shops at between £19 and £24 although the new Intellivoice cartridges are slightly dearer at £29.95.

MAY THE FORCE BE WITH YOU

THE EMPIRE STRIKES BACK

Take the controls of a soaring snowspeeder to defend the rebel base on Hoth from Darth Vadar's Imperial forces in this recreation of the fabulous battle from *The Empire Strikes Back* film.

The seemingly indestructable Walker Tanks prove formidable opponents as they plod inexorably closer to the rebels' reactor. Five Walkers, which resemble robot camels, approach the base in single file, spitting missiles from their heads and smart bombs from other parts of their anatomy.

It takes 48 hits to destroy a Walker but each series of eight hits weakens and slows it, producing a tell-tale colour change. All five must be despatched before any one of them reaches the reactor which is placed at the end of a radar strip displayed beneath the screen action.

There is just one chink in the Walkers' armour, bomb hatches which flash open on the body and a direct hit on one of these will result in instant destruction.

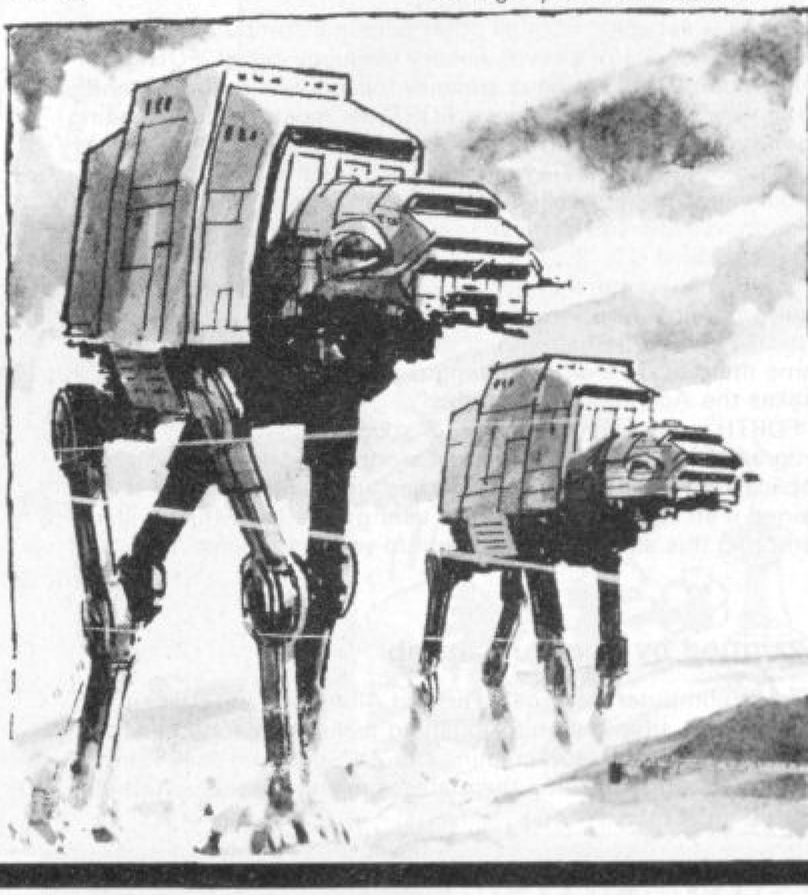
The snowspeeders's are vulnerable in comparison, any hit will badly damage them and a wise pilot puts down for repair at one of the many recovery pits before risking further punishment. Smart bombs are more dangerous than ordinary missiles. They appear with a buzz and chase the snowspeeder around the screen as he tries desperately to outmanoeuvre it or blow it up. They may also destroy the craft with just one hit.

Of course you couldn't have a *Star Wars* game without including the Force — that almost magical quality which enhances human performance — and if you can keep any snowspeeder alive for more than two minutes, the Force is with you for 20 seconds.

During those seconds the snowspeeder is all-powerful and cannot be destroyed, make the most of this period to get in some telling hits.

The Empire Strikes Back is the first of the Parker Brothers range of cartridges to be released over here. We have already received good reports of its reception in the U.S. and it is being distributed over here by toy company, Palitoy. As we mentioned last month this range of Atari-compatible cartridges is going to expand rapidly and some exciting titles are promised.

Empire Strikes Back should be in the shops now and costs £29.50.



Illustrations: Jon Davis

Probably the fastest microcomputer in the universe

the JUPITER ACE only £89.95.



All inclusive Price

For £89.95 you receive your Jupiter Ace, a mains adaptor, all the leads needed to connect to most cassette recorders and T.V.s (colour or black and white), a software catalogue and a manual.

The manual is a complete introduction to the world of personal computing and a course in FORTH programming on the Ace.

Even if you are a complete newcomer to computers, the manual will guide you step by step from first principles to confident programming.

The price includes postage packing and V.A.T.

Key Features

- Revolutionary microcomputer language FORTH.
- Full-size moving-key keyboard.
- User-defined high-resolution graphics.
- Programmable sound generator.
- Floating point arithmetic.
- Fast cassette interface.
- Upper and lower case ascii character set.
- 24 x 32 character flicker-free display.

The Jupiter Ace uses FORTH

The Ace is set apart from all other personal computers on the market by its use of a revolutionary language called 'FORTH'. Some computer languages are easy for humans to understand, others are easy for computers; FORTH is most unusual in being both. Its underlying principles are so simple that it takes even a newcomer to computers only a few minutes to learn how to do calculations on the Ace, yet the very same principles are powerful enough to allow you to invent your own extensions to the language itself.

At the same time, the memory-saving coded form used to store your programs inside the Ace allows it to obey them very fast — typically in less than a tenth of the time it would take to do the same thing using a different language. Amongst other things, this makes the Ace ideal for "games".

FORTH's unique combination of speed, versatility and ease of programming has already made it a prime choice for professional applications as diverse as pub games and radio telescopes, and gained it an enthusiastic national user group. Now the Jupiter Ace can bring this addictive language into your own home.

Designed by Jupiter Cantab

Leading computer Designers Richard Altwasser and Steven Vickers have a reputation for pushing technology forwards. After playing the major role in creating the ZX Spectrum they formed Jupiter Cantab to develop their latest brainchild the Jupiter Ace.

Technical Specification

Hardware

Processor/Memory
Z80A running at 3.25 MHz. 8K bytes ROM 3K bytes RAM.

Input
40 moving-key keyboard with auto-repeat on every key.

Output
Memory-mapped 32 x 24 character display with high resolution user graphics. Output to drive normal UHF TV set on channel 36.

Sound
Provided by internal loudspeaker.

Cassette
Load Save & Verify at 1500 baud, separate data storage.

Software, FORTH

Data Structures
Integer, Floating point and String data may be held as constants, variables or arrays with multiple dimensions and mixed data types.

Control Stuctures
IF-THEN-ELSE, DO-LOOP, BEGIN-WHILE-REPEAT, BEGIN-UNTIL, all may be mixed and nested to any depth.

Operators
Mathematical +, —, X, ÷.
Logical AND, OR, NOT, XOR.
Comparison <, >, =.

Program Editing
FORTH words may be listed, edited and redefined. Comments are preserved when words are compiled.

Order Form

The **Jupiter Ace** is available only by mail order. Please allow up to 28 days for delivery.

Send cheque or postal order with the form to:—
JUPITER CANTAB, 22 FOXHOLLOW, BAR HILL, CAMBRIDGE CB3 8EP

Please send me:—

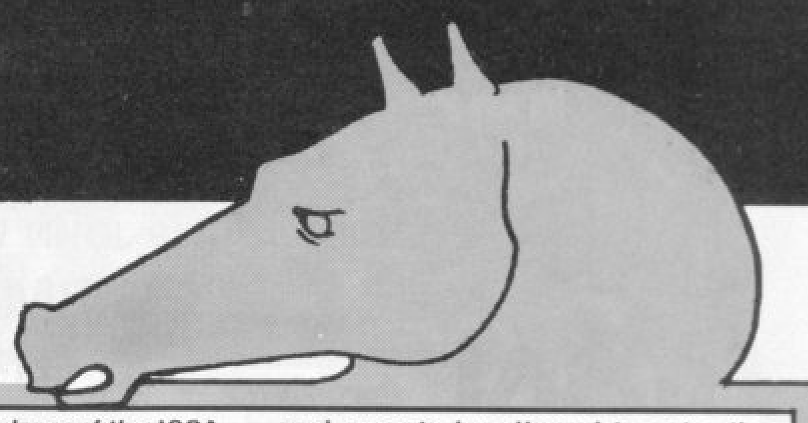
☐ JUPITER ACE MICROCOMPUTER(S) @ £89.95.

Name. Mr/Mrs/Miss

Address

CVG

CHESS



CHEQUERED MATES . . .

The International Computer Chess Association (ICCA) was formed at the second world computer chess championship in Toronto in 1977 and has just celebrated its fifth anniversary. For its first quarter century of history, computer chess managed without any central organisation at all, events being run by eager volunteers distributed sparsely throughout the world.

By 1977 it was evident that a central organisation was needed to administer an activity which was already attracting much larger audiences than most human championships.

The founding members of the ICCA were simply the competitors in Toronto. Five years later the membership stands at over 500 including a former world champion, Mikhail Botvinnik, with branches in a number of countries.

It has organised a further world championship in Austria and sanctioned a number of other events. Most importantly, the existence of ICCA has given computer chess a respectability with the conventional chess world.

ICCA has just ratified a co-operation agreement with FIDE (the International Chess Federation) and has worked painstakingly for computers to be allowed to enter human tournaments, earn international gradings and even to be allowed to enter the human world championship cycle.

It is some indication of their success in raising the overall status of computer chess that there should now be serious debate about whether entering a computer in the world championship is reasonable — not long ago, it would have aroused nothing but laughter.

The ICCA Newsletter — published three times a year — is currently the best source of up-to-date information about computers and chess.

Membership costs 10 dollars (U.S.) per annum and the secretary is Ken Thompson, Bell Telephone Laboratories, Room 2C2423, Murray Hill, NJ 07974, USA.

The latest issue of the ICCA newsletter includes analysis of all the game of the 12th North American Championship, won as so often by Ken Thompson's Belle. Here is a strong win by Duchess against the Sicilian Defence, from the first round.

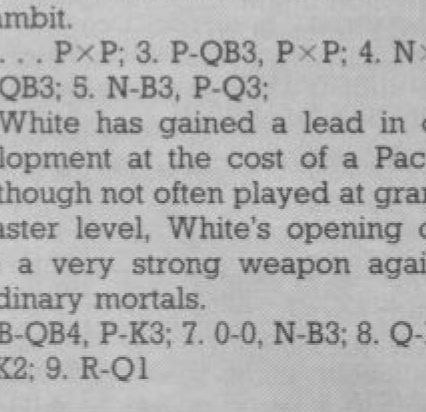
White: Duchess, Black: Awit

1. P-K4, P-QB4; 2. P-Q4. The Morra Gambit.

2. . . . P×P; 3. P-QB3, P×P; 4. N×P, N-QB3; 5. N-B3, P-Q3;

White has gained a lead in development at the cost of a Pacon. Although not often played at grandmaster level, White's opening can be a very strong weapon against ordinary mortals.

6. B-QB4, P-K3; 7. 0-0, N-B3; 8. Q-K2, B-K2; 9. R-Q1



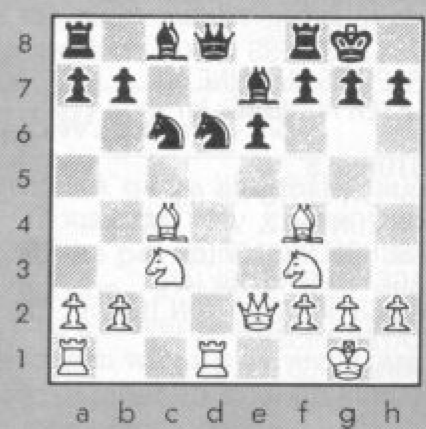
Black is now out of its 'book' and makes an immedite mistake (9. . . . P-K4 is necessary).

9. . . . O-O? 10. P-K5, N-K1; 11. P×P, N×P?

Another mistake, which loses a piece. Black had to play the unpalatable B-B3. Now Black's Knight is pinned against the Queen.

12. B-B4

White threatens to win the Knight by N-K4. Incredibly White is still 'in the book' at this point. After Black's next move, White begins to calculate its moves.

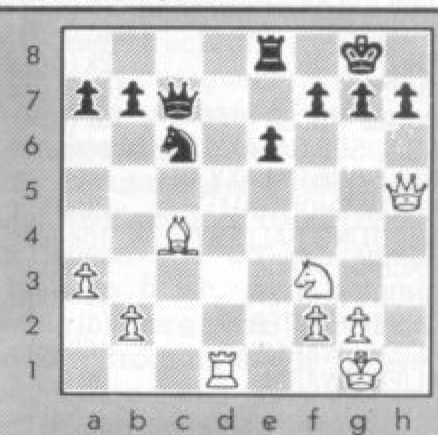


12. . . . N-N5; 13. P-QR3, N-QB3; 14. B×N? (14. N-K4 is better, winning a piece for nothing. Now Black can win another Pawn for it's piece).

14. . . . B×B; 15. N-K4, B×P ch; 16. N×B, Q-K2; 17. Q-R5, B-Q2; 18. QR-B1. (18. N-N4 threatening R×B followed by N-B6 ch wins quickly. N-N4 would still win after Black's next move).

18. . . . QR-R1; 19. N-Q6, B-K1; (White's 19th move was a mistake, simplifying the position when he still has many attacking chances).

20. N×B, R×R ch; 21. R×R, R×N; 22. N-B3, Q-B2;

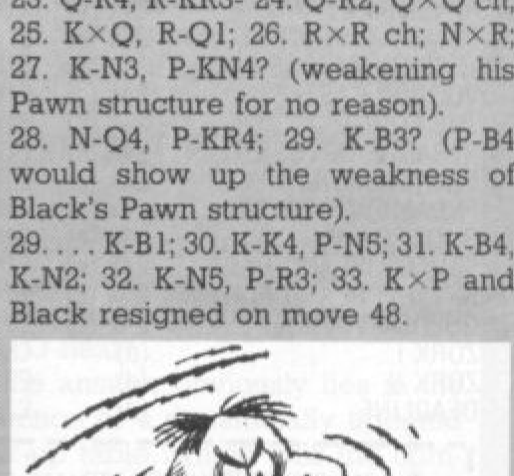


(Now 23. N-N5 threatens mate and thus wins the Pawn on K6, Black's KBP being pinned).

23. Q-R4, R-KR3- 24. Q-R2, Q×Q ch; 25. K×Q, R-Q1; 26. R×R ch; N×R; 27. K-N3, P-KN4? (weakening his Pawn structure for no reason).

28. N-Q4, P-KR4; 29. K-B3? (P-B4 would show up the weakness of Black's Pawn structure).

29. . . . K-B1; 30. K-K4, P-N5; 31. K-B4, K-N2; 32. K-N5, P-R3; 33. K×P and Black resigned on move 48.



BY MAX BRAMER

PRESTEL

NEW PATHWAYS . . .

Have you been through Prestel's GATEWAY yet? That's the latest development on the viewdata scene, and also brings Prestel a bit closer to the more familiar world of micro-computers. It is very much part of the current trend as Prestel starts to offer more to micro users, and as micro manufacturers start adding viewdata interfaces and facilities. Increasingly viewdata will provide a service to micro users.

What is GATEWAY, and how does it fit in? Basically, a GATEWAY is a standard computer concept — that of linking together different types and makes of computer. This is often far from easy, because different computers work in different ways. It is almost unheard of among micros — hardly any of them can be linked together, even ones from the same manufacturer.

The purpose of a GATEWAY is to set up standard rules and procedures to allow computers to talk to each other. This needs to be done at several levels, starting at the fundamental electrical level, and rising through more complex procedural and programming levels.

But once it is done, different computers can send and receive data and programs.

They often use the telephone system to do so — using a special new service called "packet switching" which means that instead of dialling up somebody — or some machine — you send the data off into the telephone system bundled up into the little electronic packets, and the system then directs the packets to their destinations — much like ordinary letters, except that it's all automatic, and at electronic speeds.

INTERACTIVE GAMES

In the last few months Prestel have set up their side of the GATEWAY, and a handful of other organisations have done their bit. First off the mark was Hatfield Polytechnic, with a GATEWAY into their educational database.



By Peter Linton

The second GATEWAY link was to Baric, who already have a range of games on Prestel. But via the GATEWAY link into Baric's own computer, it's been possible to open up a couple of proper "interactive" games, much more like proper micro games. One is Bulls and Cows also known as Mastermind in which you have to guess a four-digit number. You get some clues if you guess the right number, and or its correct position.

GATEWAY ACTS

On Prestel, a game like that would take thousands of pages to cover all the permutations. In the Baric version, it needs just one page, plus a clever program behind it. The reason why it's cleverer than a microcomputer version we'll look at in a moment.

The other interactive offering on Baric is a biorhythms calculator, showing in graphic form whether you are emotionally, physically and intellectually up or down — or just in the critical inbetween stage.

Other games are likely to appear via GATEWAY soon, as other organisations get their GATEWAY acts together — technically it is fairly complex. Because of the limitations of Prestel graphics and the capacity of telephone lines, they will never be as fast or powerful as the best micro or arcade games. But GATEWAY will make Prestel games better — and more fun.

There is an interesting technical aspect in programming such games that you might like to experiment with on your micro.

A GATEWAY game like Bulls and Cows has to be able to handle more than one user at a time — unlike a micro.

There might be 20 or more simultaneous users, all at different stages in the game. While some are thinking about their next guess, others are typing it in.

KEEPING TRACK . . .

So the first problem is that the program cannot simply start at the beginning, and run through to the end. It has to keep track of every user, what his previous guess was, and which part or segment of the program he should go to next.

That's the fundamental difference between what's called "batch" computing, where you do one thing from start to finish, and "online" computing, where you are connected to a program that is always live, never stops, and takes a large and changing number of users through the program.

Not only that, but the computer may have up to 40 different programs, with dozens of different users all expecting the machine to produce the right answers — and fast.

BE DYNAMIC

How would you write a program that could keep track of different users, what stage they were at, and which program line they should GOTO next?

The answer obviously lies in the direction of a dynamically updated look-up table, which tells the computer where it's at.

It gets fairly complex, but it's a vital aspect of modern computing, and one of the important differences between a micro and a mainframe computer.

Still once you've cracked it you can start work on a GATEWAY into your own micro.

THE FANTASTIC FREAK

TIPS ON TEMPEST



Tempest as we know it today is a freak of design — the original game was intended to be a monster scenario — the cabinets being illustrated with hairy beasts.

Only just before the game was due to go on general release did the designers realise that the Atari video screen would not produce the required monster graphics.

A new format was hastily worked out, the cabinets repainted, and one of the most popular video games of the moment hit the arcades.

Tempest graphics are surprisingly distinctive considering the rushed manner in which the final product was conceived.

The game features sixteen different electrical force fields — each inhabited by a series of colourful electrical enemy shorts. You are an open electrical circuit and your task is to electrocute the enemy in a highly charged force field.

Once you have destroyed the enemy in one pattern you are sucked through the centre of the screen and placed in a new electrical field with a new 3D pattern.

Your controls feature a control knob which is rather like the tuner on a transistor radio — it moves you at great speed around all the open lanes. It is your key to success in Tempest — and you must develop a feel for its sensitive reaction to touch.

The first button is fairly simple. You have an unlimited supply of ammunition so it is advisable to keep up a fairly constant barrage of fire. The Super Zapper must be used selectively as it can only be used twice in any one pattern. The first time you use it it will destroy all your enemies with the exception of the Spikes.

The second time you use the Super Zapper it will only destroy the enemy that it considers to be of the greatest immediate threat.

Your electrical adversaries vary in aggressiveness and cunning — and so the points you are awarded for electrocuting them vary accordingly as well.

Trickiest of all are the Flippers which can flip from lane to lane and move at lightning speed. The best way to deal with these ominous star shapes is to shoot them fast before they reach the end of a lane.

Tankers present little threat in themselves but you still have to pick them off before they reach the top of a lane as they will then spawn two Flippers. If this happens you will have to spin right and fire and then spin left and fire to pick off the two newly born Flippers before they can cause you any harm.

Fuseballs are also difficult to deal with and are the key to high scores — particularly at the higher levels of play. These red, yellow, and blue snowflake structures are difficult to shoot as they change lanes and dodge up and down to avoid your fire. Fuseballs are worth having at 250, 500 or 750 points depending on the level of play.

Pulsars can short circuit lanes and hem you in a restricted sector of the pattern as it is impossible for you to cross lanes that have been short circuited. Pulsars can only be killed when they are in the process of crossing lanes. Pulsars must be killed at the earliest possible opportunity. They are worth 200 points.

Spikers are slow moving enemies worth only 50 points but it is as well to get them early if you can as they can shoot spikes which can cause you problems when you try to move onto a new pattern.

There are basically two types of pattern in Tempest. Patterns that you can spin right round and patterns that you cannot spin right around. In the latter case you must find a safe place at the right or left extremity of the pattern from which you can shoot your trickiest opponents.

Whatever the pattern shape the golden rule is to move and fire constantly. You will not stay alive long in Tempest if you stay in one place.

Skilled players can choose to commence their game at a higher level — there are five entry levels. It is also possible to begin a new game where you left off if you have reached a sufficiently high level as long as you insert your coins within 30 seconds of the previous game ending.

BIRD WATCHING ON THE FAIRWAYS

BIRDIE KING



Illustration: Jon Davis

Take to the fairways of your local arcade and see if you can club your way round this nine-hole golf course.

There are two balls to keep an eye on in this game. The one which you address with your club on the screen and the "roller ball" which is the only control needed to play it.

The roller ball dictates distance of shot and accuracy by the speed and direction you run your hand over it.

It is a tricky piece of control which will quickly single out the skilful players. There are nine holes in the basic game with extra holes awarded to players who notch up under-par scores such as Birdies, Eagles and Albatrosses, for one, two or three-under-par scores. Hence the name of the game.

The hole-in-one player won't have to buy a round of drinks afterwards but he should notch up six extra holes to play.

The beginner must take care to look at the flag, which indicates how the wind is blowing. It is possible for him to go out-of-bounds and forfeit a stroke or ruin his chances by going more than three over par — the machine can be altered by the operator to call a halt when so many strokes over par are scored by the player. Three is the most difficult setting.

The holes increase in difficulty as the game goes on, but beginners have a good chance of progressing a good way into the game and so learning it.

ACTION



Illustration: Terry Rogers

WE'RE GOING APE OVER TARZAN!

JUNGLE KING

You may not be able to beat the game but at least you can beat your chest in Jungle King.

If the famous Ape-man Tarzan was your boy- (or girl-)hood hero be prepared for a few surprises in this video version of jungle life.

For a start there's trouble with Cheetah, the silly chimp and his monkey mates just can't seem to stay out of Tarzan's way as he swings through his jungle home.

The first phase of the game sees Tarzan swinging on the lianas that hang from the trees. You must judge his jumps for him by use of a jump button and a four-way joystick. But watch out for those clumsy monkeys.

Having survived this aerial journey between the branches, Tarzan's next task is fairly standard piece of daring-do, he leaps into the water to take on the crocodiles.

Armed only with a knife and making good use of the joystick and the stab button he swims along under water battling off the crocs and making the most of the available air pockets. Occasionally he will get trapped in an air-pocket and be carried helplessly to the surface.

The third stage of the game involves a steep hill and a landslide of boulders falling down it. Tarzan has two choices here, he can either jump over the low bouncing ones or fall flat beneath the higher ones.

The final scenario fulfils Tarzan's worst fears: "Jane, she captured by cannibals!" And the painted devils are lowering our heroine into the cooking pot too. The cannibals are armed with spears and Tarzan has lost his knife but must try to stay out of range of the spears and jump over the cannibals to perform his rescue.

And then the whole sequence starts again except that things are speeded up, with more hazards.

The game comes with a nice line in graphics, jungle noises and beat the chest-type Tarzan roars.



YOU'VE SEEN THE FILM

ARCADE TRON

Tron — the new science fantasy film from Walt Disney Productions takes place — in case you don't already know by now — inside a computer. The hero of the film is challenged to fight for his life in a series of video style games.

Arcade Tron is manufactured by Bally Midway and goes on general release in the UK this Autumn to coincide with the release of the film.

The game is already a big success in the United States. A nationwide competition has already been played. The champ clocked up more than a million points in a marathon eight hour game.

The controls are fairly simple. You have a Gorf type joystick — which you can grasp firmly in your whole hand, using your index finger to fire. You also have a knob which can turn Tron's arm through 360 degrees. There are four levels of play — all based on themes from the film.

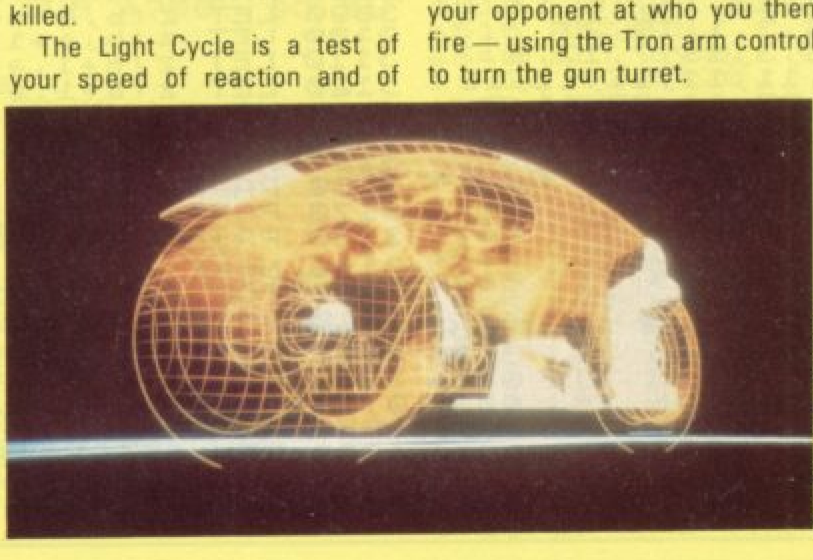
The Cone Challenge is based on Tron's attempt to get into the MCP — the computer's nerve-centre — before he can destroy it.

You have to rise up through the cone shooting out all the colourful bricks which appear — one after the other, to block your way. If you touch any of these bricks on your way up you will be "de-rezzed". Tronology for being killed.

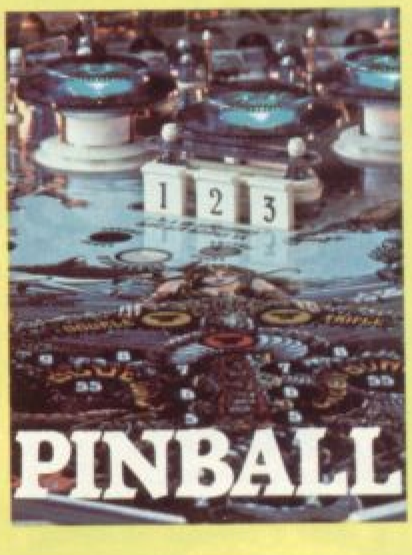
The Light Cycle is a test of your speed of reaction and of your ability to steer round your opponent. You must draw a complete line with your solid slip-stream around the bike which is chasing you.

The Grid Bug test is the most difficult of all. The Grid Bugs are a breed of computerised spiders who swarm down towards you, preventing your entry to the transporter, which will take you safely on to the next challenge.

The fourth challenge, Tank Chase, incorporates a Pacman type maze. You steer your tank through the maze seeking out your opponent at who you then fire — using the Tron arm control to turn the gun turret.



Walt Disney Productions



Hot on the heels of Mr and Mrs Pac-Man-Bally's adaptation of a video game theme — comes a true pinball/video combination called Caveman.

Gottlieb are the people behind this innovation in pin-table design which features a video screen within the playfield. It's "The best of Both Worlds" as the publicity blurb says.

You have to trap the ball in one of two special channels before you'll get a crack at the video game feature. This is a maze type game which shows a caveman chasing various dinosaurs. But he in turn is pursued by a killer Tyrannosaurus.

If this killer beast catches your caveman the ball drains and the pintable is back in action.

There is a joystick attachment at the front of the table which is used to direct the caveman around the maze when the video is activated.

Hitting targets on the table also affects play in the video game maze. Hitting drop targets and rollovers will replace Tyrannosaurus with bonus scoring Pterodactyls in the video maze. Hitting the vari-targets determines how long these flying horrors stay on the screen.

Gottlieb hope that this combination will make video players take a look at pinball — and pinball players at video games.

We'd like to tell you a bit more about the game — but the table has proved difficult to track down. Gary Flower of the Pinball Owners Association says one member has reported a sighting of this intriguing pin — maybe someone out there has played on one? How about letting us know what you thought?



```
   1 DEF FN R(x)=INT (RND*x)+1
   3 GO SUB 7000
   5 GO SUB 7200
  10 REM towns & aliens
  20 LET w1=BIN 11111101
  30 LET w2=BIN 11111111
  40 LET w3=BIN 10000000
  50 LET w4=BIN 00000011
  60 FOR i=0 TO 7
  70 READ j
  80 POKE USR "■"+i,j
  90 NEXT i
 100 DATA w2,w1,w1,BIN 11011101,
BIN 10001101,BIN 10100100,w3,w3
 110 FOR i=0 TO 7: READ j
 120 POKE USR "■"+i,j
 130 NEXT i
 140 DATA w2,w2,BIN 10111111,BIN
 00010111,w4,w4,w4,BIN 00000001
 150 FOR i=0 TO 7: READ j
 160 POKE USR "■"+i,j: NEXT i
 170 DATA 0,BIN 00011000,BIN 011
11110,BIN 11011011,BIN 11111111,
BIN 01100110,0,0
 300 DIM z(20,30)
 320 DIM h(20,30)
 340 DIM d(8): DIM e(8)
 400 DATA 3,7,5,15,7,27,9,21,11,
9,13,3,15,15,17,23
 420 DATA 3,15,17,13,17,15,17,17
 430 DATA 1,3,1,5,3,1,19,27
 440 DATA 3,25,15,3,15,7,17,5
 450 DATA 7,11,9,11,11,11,11,19
 460 DATA 9,25,9,27,11,27,11,3
 500 LET ea=18: LET eb=18
 520 LET t=2: LET q1=0
 530 LET p1=0: LET p2=0: LET p3=
0
 620 GO SUB 2000
 640 GO SUB 3000
 660 GO SUB 4000
 680 GO SUB 4100
 700 LET wn=FN R(8): LET wm=FN R
(2)
 704 LET rc=FN R(4)*5
 708 LET rh=FN R(4)*5
 712 LET k2=1: LET k3=1: LET k5=
1
 716 FOR q=1 TO 30
 720 GO SUB 4340
 725 NEXT q
 730 GO SUB 7470
 740 GO SUB 4350
 750 GO TO 730
1000 STOP
2000 REM DRAW TOWNS
2010 FOR i=1 TO 8
2020 READ d(i): READ e(i)
2025 NEXT i
2030 FOR i=1 TO 8
2035 PRINT AT d(i),e(i);"■"
2040 PRINT AT d(i)+1,e(i);"  "
2050 LET z(d(i),e(i))=i+6
2060 LET z(d(i),e(i)+1)=i+6
2070 LET z(d(i)+1,e(i)+1)=i+6
2080 LET z(d(i)+1,e(i))=i+6
2085 PRINT AT 10,22;"2": PRINT A
T 12,10;"1"
2090 NEXT i
2100 RETURN
3000 REM DRAW BOARD
3010 LET c=2
3020 FOR i=1 TO 5
3030 FOR j=1 TO 4
3040 READ b: READ a
3050 PRINT AT b,a; PAPER c;" "
3060 PRINT AT b+1,a; PAPER c;" "
3070 PRINT AT b+1,a+1; PAPER c;"
3080 PRINT AT b,a+1; PAPER c;" "
3090 LET z(b,a)=c
3100 LET z(b,a+1)=c
3110 LET z(b+1,a+1)=c
3120 LET z(b+1,a)=c
3130 NEXT j
3140 LET c=c+1
3150 NEXT i
3160 PAPER 7
3170 FOR i=1 TO 10
3180 PRINT AT i*2-1,0;CHR$ (i+79)
3190 NEXT i
3200 FOR i=1 TO 15
3210 PRINT AT 0,i*2-1;CHR$ (i+64)
3220 NEXT i
3230 PLOT 8,8: DRAW 239,0: DRAW
0,159: DRAW -239,0: DRAW 0,-159
3250 RETURN
4000 REM SPACECRAFT CODES
4010 DIM s(5)
4015 RANDOMIZE
```

SPACE WATCH

U.F.O. sightings have been reported over a large area and the evidence is pouring into Space Watch headquarters.

You are in charge of the search teams which must be sent out to try and find the aliens before a similar agency from a foreign power can contact them.

The alien sightings are the clue to how they can be tracked down and the code (a sort of Close Encounters sounds sequence, except that it is in colour) which must be used in making contact.

There are five alien craft in the vicinity and the information you have so far received has tempted you to give each craft a name.

The Mothership is always the same colour as the Watcher and appears in the centre of the screen.

The Chaser is so-named because of its speed, it flies rapidly across the boundaries of the land but never deviates from a straight line flight path.

The Hoverer also follows a straight flight path but is slower, travelling just half a sector each turn compared to the Chaser's whole sector.

The Watcher pursues a circular path either one or a half sector is crossed in a day.

But the enigmatic Destroyer follows no fixed route although it does seem to travel just half a sector at a time. This craft is the most easy to confuse in sightings as it may sometimes copy the flight patterns of the Hoverer and Watcher craft.

The aliens are wary of humans, and unless contact is made quickly there is a very real fear that the Destroyer will live up to his name.

The aim of the game is to find the alien code of five colours and put them in the right order you will then be able to make contact.

Each search you undertake can be across, one sector, four sectors or 16 sectors of the board. But each search depletes your energy reserves and when these drop below six the Destroyer will move in to try and blow-up your Space Watch H.Q.

Each search is also given a colour code. And only that colour of craft will show up. If you key in red (2), only a red craft will show on your radar scan, all others will remain invisible. You will also be able to see which areas your opponent is searching and whether he finds any craft.

When you think you know the code of each craft you can try out your guess. Inputting the information in the order: Mothership, Chaser, Hoverer, Watcher, Destroyer. So, discovering which of the craft you are tracking, is which, is vital.

There are a couple of other twists: a red craft will not show up on a red background. And if you see the Destroyer moving close to your City HQ (marked with a "1" and "2" for first and second player) you can expend energy setting up a defensive screen around the HQ.

The game starts with UFO sightings coming in from the cities and these usually dictate the tactics for the rest of the game.

RUNS ON A SPECTRUM

BY KATE CLEMENTS

```
4020 FOR i=2 TO 5
4030 LET s(i)=FN R(5)+1
4050 NEXT i
4055 LET s(1)=s(4)
4060 RETURN
4100 REM PLOT INITIAL POSITIONS
4110 LET my=FN R(8)+2
4120 LET mx=FN R(8)+11
4130 IF z(my,mx)=s(1) THEN GO TO
 4110
4140 IF z(my,mx)>6 THEN GO TO 41
10
4145 LET k=1: GO SUB 4700: GO SU
B 4800
4150 LET cy=FN R(20)
4160 LET cx=FN R(30)
4162 LET k=2: GO SUB 4700: GO SU
B 4800
4180 LET hy=FN R(20)
4190 LET hx=FN R(30)
4192 LET k=3: GO SUB 4700: GO SU
B 4800
4210 LET wy=FN R(8)+6
4220 LET wx=FN R(16)+6
4222 LET k=4: GO SUB 4700: GO SU
B 4800
4230 LET dy=FN R(20)
4240 LET dx=FN R(30)
4242 LET k=5: GO SUB 4700: GO SU
B 4800
4250 RETURN
4340 REM move craft
4343 PRINT AT 21,0;"City check o
n UFOs No.";q
4350 LET k=1: GO SUB 4700: GO SU
B 4800
4360 REM watcher
4370 LET y=wy: LET x=wx
4380 GO SUB 5500
4401 LET wn=wn+1: IF wn=9 THEN L
ET wn=1
4410 LET k=4: GO SUB 4700: GO SU
B 4800: GO SUB 4820
4415 GO SUB 4700: GO SUB 6000
4420 REM chaser
4422 LET y=cy: LET x=cx
4425 GO SUB rc+4595
4427 IF k2=6 THEN GO TO 4434
4429 LET k=2: GO SUB 4700: GO SU
B 4850
4432 IF k2=2 THEN GO TO 4550
4434 LET k2=1
4436 GO SUB 4700: GO SUB 4800: G
O SUB 4820
4438 GO SUB 6000
4440 REM hoverer
4441 LET k=3
4442 LET y=hy: LET x=hx
4445 GO SUB rh+4620
4446 IF k3=6 THEN GO TO 4453
4448 GO SUB 4700: GO SUB 4850
4452 IF k3=3 THEN GO TO 4560
4453 LET k3=1
4456 GO SUB 4700: GO SUB 4800: G
O SUB 4820
4457 GO SUB 6000
4460 REM destroyer
4462 LET k=5
4465 LET y=dy: LET x=dx
4470 LET rd=FN R(4)*5
4480 GO SUB rd+4655
4485 GO SUB 4700: GO SUB 4850
4490 IF k5=5 THEN GO TO 4540
4500 GO SUB 4700: GO SUB 4800: G
O SUB 4820
4505 IF ea<6 THEN LET p3=1: GO S
UB 8300
4506 IF eb<6 THEN GO SUB 8300
4510 GO SUB 6000
4515 RETURN
4540 LET dy=y: LET dx=x: LET k5=
1: GO TO 4470
4550 LET cy=y: LET cx=x: LET k2=
6: GO TO 4425
4560 LET hy=y: LET hx=x: LET k3=
6: GO TO 4445
4600 LET cx=cx+2: RETURN
4605 LET cx=cx-2: RETURN
4610 LET cy=cy+2: RETURN
4615 LET cy=cy-2: RETURN
4625 LET hx=hx+1: RETURN
4630 LET hx=hx-1: RETURN
4635 LET hy=hy+1: RETURN
4640 LET hy=hy-1: RETURN
4660 LET dy=dy+1: RETURN
4665 LET dy=dy-1: RETURN
4670 LET dx=dx-1: RETURN
4675 LET dx=dx+1: RETURN
4700 REM check coordinates
4710 IF k=1 THEN LET f=mx: LET g
```

```
=my: RETURN
4720 IF k=2 THEN LET f=cx: LET g
=cy: RETURN
4730 IF k=3 THEN LET f=hx: LET g
=hy: RETURN
4740 IF k=4 THEN LET f=wx: LET g
=wy: RETURN
4750 IF k=5 THEN LET f=dx: LET g
=dy: RETURN
4800 REM remember craft position
s
4810 LET h(g,f)=k
4815 RETURN
4820 LET h(y,x)=0
4825 RETURN
4850 REM borders
4860 IF f<1 THEN GO SUB 5000
4864 IF g<1 THEN GO SUB 5000
4868 IF g>20 THEN GO SUB 5000
4870 IF f>30 THEN GO SUB 5000
4880 RETURN
4900 REM redraw towns
4910 FOR l=1 TO 8
4920 PRINT AT d(l),e(l);"▀▀▀"
4925 PRINT AT d(l)+1,e(l);"   "
4930 NEXT l
4935 PRINT AT 10,22;"2": PRINT A
T 12,10;"1"
4940 PLOT 8,8: DRAW 239,0: DRAW
0,159: DRAW -239,0: DRAW 0,-159
4950 RETURN
5000 REM change move
5020 IF k=2 THEN GO SUB 5100: RE
TURN
5030 IF k=3 THEN GO SUB 5130: RE
TURN
5040 LET k5=5: RETURN
5100 LET k2=2
5110 IF rc=5 THEN LET rc=10: RET
URN
5115 IF rc=15 THEN LET rc=20: RE
TURN
5120 LET rc=rc-5: RETURN
5130 LET k3=3
5140 IF rh=5 THEN LET rh=10: RET
URN
5145 IF rh=15 THEN LET rh=20: RE
TURN
5150 LET rh=rh-5: RETURN
5500 REM watcher circle
5510 IF wn=1 THEN LET wx=wx-wm:
RETURN
5520 IF wn=2 THEN LET wx=wx-wm:
LET wy=wy-wm: RETURN
5530 IF wn=3 THEN LET wy=wy-wm:
RETURN
5540 IF wn=4 THEN LET wx=wx+wm:
LET wy=wy-wm: RETURN
5550 IF wn=5 THEN LET wx=wx+wm:
RETURN
5560 IF wn=6 THEN LET wy=wy+wm:
LET wx=wx+wm: RETURN
5570 IF wn=7 THEN LET wy=wy+wm:
RETURN
5580 IF wn=8 THEN LET wx=wx-wm:
LET wy=wy+wm: RETURN
6000 REM craft over cities
6020 IF z(g,f)>6 THEN GO SUB 605
0
6040 RETURN
6050 FOR j=1 TO 8
6060 IF z(g,f)=j+6 THEN GO SUB 6
080
6070 NEXT j: RETURN
6080 PRINT AT d(j)+1,e(j); INK s
(k);"♣"
6090 PAUSE 200: PRINT AT d(j)+1,
e(j);"  "
6095 RETURN
6500 REM colour check
6510 LET c$="Please put in your
colour code": GO SUB 7900
6520 INPUT sc
6530 IF sc<2 OR sc>6 THEN LET c$
="Please re-enter: between 2 and
 6": GO SUB 7900: GO TO 6520
6540 IF en=0 THEN LET v3=-1: LET
 v4=0
6550 IF en=1 THEN LET v3=-3: LET
 v4=0
6553 IF en=5 THEN LET v3=-5: LET
 v4=2
6557 FOR i=v3 TO v4: FOR j=v3 TO
 v4
6560 IF h(yc*2+i,xc*2+j)=0 THEN
```

```
GO TO 6580
6570 IF z(yc*2+i,xc*2+j)=sc THEN
 GO TO 6580
6575 IF s(h(yc*2+i,xc*2+j))=sc T
HEN GO SUB 6600
6580 NEXT j: NEXT i
6585 IF q1=0 THEN LET c$="No cra
ft of that colour here": GO SUB
7900
6588 LET q1=0
6590 RETURN
6600 REM print findings
6610 PRINT AT yc*2+i,xc*2+j; PAP
ER 8;"♣"
6620 PAUSE 100
6630 PRINT AT yc*2+i,xc*2+j; PAP
ER 8;" "
6635 LET q1=1
6640 IF en>0 THEN GO TO 6650
6645 CIRCLE v1,v2,cc: RETURN
6650 CIRCLE v1-8,v2+8,cc: RETURN
7427 GO SUB 7460: CLS
7430 PRINT "But a warning if you
r energy is below 6 the Destroye
r can move"
7435 PRINT "in and bomb your cit
y HQ if it  is flying over that
city sector"
7437 PRINT "": PRINT "The first
player's city is shownwith a 1:T
he second player's bya 2."
7440 PRINT "You can prevent this
 by using 3 energy points to set
 up a screen around your town"
7445 PRINT "": PRINT "Important:
A player should not   watch the
screen while his oppo-nent enter
s his colour code"
7450 GO SUB 7460: CLS : RETURN
7460 LET c$="Hit 'enter' to cont
inue": GO SUB 7900
7462 INPUT i$
7465 RETURN
7470 REM which player
7475 IF t=1 THEN LET t=2: GO TO
7485
7480 IF t=2 THEN LET t=1
7485 GO SUB 7500
7487 GO SUB 4900
7490 IF t=1 THEN LET ea=ea-en
7495 IF t=2 THEN LET eb=eb-en
7497 RETURN
7500 REM move
7502 IF t=1 THEN LET ec=ea
7505 IF t=2 THEN LET ec=eb
7510 IF t=1 THEN PRINT AT 21,0;"
It is ";A$;"'s turn to search":
PAUSE 100
7520 IF t=2 THEN PRINT AT 21,0;"
It is ";b$;"'s turn to search":
PAUSE 100
7522 PRINT AT 21,0;"You have ";e
c;" energy left          ": PAUSE
100
7530 LET c$="Do you want to gues
s alien code?": GO SUB 7900
7540 INPUT i$: IF i$="y" THEN GO
 SUB 8000
7550 LET c$="How much energy wil
l you use?": GO SUB 7900
7585 INPUT en
7590 IF en>ec THEN LET c$="You d
on't have that much energy": GO
SUB 7900: GO TO 7550
7600 IF en=0 THEN GO TO 7651
7610 IF en=1 THEN GO TO 7642
7620 IF en=5 THEN GO TO 7642
7630 IF en=3 THEN GO SUB 8500: R
ETURN
7640 LET c$="Please re-assess en
ergy use": GO SUB 7900: GO TO 75
85
7642 LET c$="I need a central co
-ordinate to": GO SUB 7900
7645 LET c$="use as a base for t
his search": GO SUB 7900
7651 LET c$="Name the square:cap
itals please": GO SUB 7900: LET
c$="Vertical co-ordinate first":
 GO SUB 7900: GO SUB 7940
7670 IF en=0 THEN LET cc=8: GO T
O 7720
7680 IF en=1 THEN LET ce=1: LET
cc=16: GO TO 7700
7690 LET ce=2: LET cc=32
```

```
7700 IF yc<=ce OR yc>=(12-ce) TH
EN LET c$="Your search is too cl
ose to edge": GO SUB 7900: GO TO
 7642
7710 IF xc<=ce OR xc>=(17-ce) TH
EN LET c$="Your search is too cl
ose to edge": GO SUB 7900: GO TO
 7642
7720 LET v1=xc*16-1: LET v2=175-
16*yc
7725 IF en>0 THEN GO TO 7740
7730 CIRCLE OVER 1;v1,v2,cc: GO
SUB 6500: CIRCLE OVER 1;v1,v2,cc
: RETURN
7740 CIRCLE OVER 1;v1-8,v2+8,cc:
 GO SUB 6500: CIRCLE OVER 1;v1-8
,v2+8,cc: RETURN
7900 PRINT AT 21,0;c$: PAUSE 100
7910 PRINT AT 21,0;"
                    ": RETURN
7940 INPUT y$
7950 LET yc=CODE y$-79
7960 IF yc<1 OR yc>10 THEN GO SU
B 7990 : GO TO 7940
7965 INPUT x$
7970 LET xc=CODE x$-64
7975 IF xc<1 OR xc>15 THEN GO SU
B 7990: GO TO 7965
7980 RETURN
7990 LET c$="Wrong letter:please
 try again": GO SUB 7900
7995 RETURN
8000 REM alien code
8010 CLS : PRINT AT 6,0;"Input t
he colours in order"
8020 PRINT AT 7,0;"Mothership,Ch
aser,Hoverer,"
8030 PRINT "Watcher,Destroyer."
8040 FOR i=1 TO 5
8050 INPUT l: IF l<2 OR l>6 THEN
 GO TO 8050
8060 PRINT INK l;"♣": IF l<>s(i)
 THEN GO TO 8100
8070 NEXT i
8080 PRINT "Correct:"
8085 IF t=1 THEN PRINT a$;" is t
he winner"
8090 IF t=2 THEN PRINT b$;" is t
he winner"
8095 STOP
8100 PRINT "Wrong:the correct an
swer is:"
8110 FOR i=1 TO 5: PRINT INK s(i
);"♣": NEXT i
8120 IF t=1 THEN PRINT b$;" is t
he winner": STOP
8130 IF t=2 THEN PRINT a$;" is t
he winner": STOP
8300 REM destroy
8310 IF p1=1 AND p3=1 THEN RETUR
N
8320 IF p2=1 THEN RETURN
8330 IF p3=1 THEN GO TO 8360
8340 IF dy<9 OR dy>10 THEN RETUR
N
8350 IF dx<22 OR dx>23 THEN RETU
RN
8355 LET c$="The destroyer has b
ombed your HQ": GO SUB 7900
8357 PRINT AT 21,0;a$;" is the w
inner": STOP
8360 IF dy<11 OR dy>12 THEN RETU
RN
8370 IF dx<10 OR dx>11 THEN RETU
RN
8380 LET c$="The destroyer has b
ombed your HQ": GO SUB 7900
8390 PRINT AT 21,0;b$;" is the w
inner": STOP
8500 REM city defence
8510 LET c$="I have put a defens
ive screen": GO SUB 7900
8515 LET c$="Around your city he
adquarters": GO SUB 7900
8520 IF t=1 THEN LET p1=1: GO TO
 8550
8530 LET p2=1
8550 RETURN
7000 REM players names
7010 BORDER 0: PAPER 0: CLS : IN
K 7
7020 FOR i=1 TO 30
7030 LET t=FN R(255): LET u=FN R
(175)
7040 PLOT t,u: NEXT i
7050 INK 6: PRINT AT 5,8;"YOU AR
E ENTERING": PAUSE 30
7060 PRINT AT 7,7;"A PROHIBITED
AREA-": INK 7: PAUSE 30
7070 PRINT AT 9,10; FLASH 1;"SPA
CE WATCH"
7080 PRINT AT 11,9;"PERSONNEL ON
LY": PAUSE 50: FLASH 0
7090 PAUSE 50: PAPER 7: CLS : IN
K 0: RETURN
7200 LET c$="WELCOME TO PROJECT
'SPACE WATCH'": GO SUB 7900
7210 LET c$="PLAYER 1: PLEASE EN
TER YOUR NAME": GO SUB 7900: INP
UT a$
7215 IF LEN a$>8 THEN LET c$="Ei
ght characters only please": GO
SUB 7900: GO TO 7210
7220 LET c$="PLAYER 2: PLEASE EN
TER YOUR NAME": GO SUB 7900: INP
UT b$
7225 IF LEN b$>8 THEN LET c$="ei
ght letters only please": GO SUB
 7900: GO TO 7215
7230 LET c$="DO YOU WANT INSTRUC
TIONS:y OR n?": GO SUB 7900
7240 INPUT i$: IF i$="y" THEN GO
 SUB 7300
7250 RETURN
7300 REM instructions
7305 PRINT AT 7,0;"INSTRUCTIONS"
: GO SUB 7460: CLS
7310 PRINT "Space Watch is for t
wo players  Each is trying to co
ntact aliens"
7320 PRINT "which have five craf
t on Earth.": PRINT "": INK 2
7330 PRINT "The game starts with
 UFO reports coming in from the
city squares"
7335 PRINT "30 reports show if a
 craft has  moved over any city
in every    movement turn"
7337 PRINT "": PRINT "It may be
wise to chart these   reports":
GO SUB 7460: CLS
7340 PRINT "The aliens each have
 a colour   code and a unique fl
ight pattern to distinguish them
"
7345 PRINT "": INK 1
7350 PRINT "The craft, in order,
 are:"
7354 PRINT "Mothership-never mov
es"
7358 PRINT "Chaser-fast straight
 flights"
7362 PRINT "Hoverer-slow straigh
t flights"
7366 PRINT "Watcher-circles"
7370 PRINT "Destroyer-slow rando
m pattern"
7380 GO SUB 7460: CLS
7385 PRINT "Players search the b
oard sectorsusing energy and col
our codes"
7390 PRINT "More energy is used
up by large searches:1 sector =
0 energy"
7395 PRINT "4 sectors=1 energy:
16 sectors = 5 energy"
7400 PRINT "": PRINT "The colour
 code will only show  up craft o
f the same colour"
7405 PRINT "The codes can be 2-5
.Matching    craft colours of:red
,magenta,    green,cyan and yello
w"
7410 PRINT "A craft on its own c
olour back  ground will not show
 on a search"
7420 PRINT "": INK 0: PRINT "By
searching the player will dis-co
ver the colour code of each"
7425 PRINT "He can then enter th
e codes (in the right order) and
 win"
```



WORD SEARCH

RUNS ON A ZX81 IN 16K

BY TUDOR COSTIGAN

Why not dip into your Oxford English Dictionary and engage your ZX81 in a war of words? This game is for the more literary minded among you — a sort of computerised crossword.

You simply type in up to nine words all the same length — anything from two to nine characters. The computer will then hide them in a 15 by 20 matrix jumbled up with other random letters. All you have to do is find where the computer has hidden the words.

You have to tell it the co-ordinates of the first letter, the direction of the word and the number of the word. As you find the words the computer "inverts" them on the screen.

```
  HERE IS A LIST OF THE
VARIABLES USED:

  A$(15,20):THE DISPLAYED ARRAY
            OF LETTERS.
  NW        :THE NO. OF WORDS.
  NWTF      :THE NO. OF WORDS
            LEFT TO FIND.
  LENGTH    :THE LENGTH OF THE
            WORDS.
  W$(NW,LENGTH):THE LIST OF
            WORDS DISPLAYED TO
            THE RIGHT OF THE
            SCREEN.
  S$        :A RANDOM LETTER.
  D         :THE DIRECTION OF A
            WORD.
  N         :THE NO. IN THE LIST
            OF THE WORD.
  Q,U,X,Y,Z:"GENERAL" VARIABLES
            USED THROUGHOUT THE
            PROGRAM IN LOOPS,
            ETC.
```

```
   5 RAND
  10 DIM A$(15,20)
  20 PRINT ,"WORD SEARCH"
  30 PRINT ,">>>>*<<<<<"
  35 GOSUB 9000
  40 PRINT AT 6,0;"HOW MANY WORD
S (MAX=9) ?"
  50 INPUT S
  60 IF S<1 OR S>9 THEN GOTO 50
  70 LET NW=S
  71 LET NWTF=NW
  75 FOR Q=1 TO 40
  76 NEXT Q
  80 PRINT AT 6,0;"HOW MANY LETT
ERS WILL EACH WORD"
  81 PRINT "HAVE ?"
  85 IF INKEY$="" THEN GOTO 85
  86 LET S$=INKEY$
  90 IF CODE (S$)<30 OR CODE (S$
)>37 THEN GOTO 85
  95 LET LENGTH=CODE (S$)-28
  96 PRINT AT 6,0;"
                              "
  99 DIM W$(NW,LENGTH)
 100 FOR Z=1 TO NW
 110 PRINT AT 21,0;"WORD ";Z;" ?
"
 120 INPUT X$
 130 IF LEN (X$)<>LENGTH THEN GO
TO 120
 131 FOR S=1 TO Z-1
 132 IF X$=W$(S) THEN GOTO 120
 133 NEXT S
 140 LET W$(Z)=X$
 150 NEXT Z
 160 CLS
 170 FAST
 180 FOR Z=1 TO NW
 190 LET Y=15
 200 LET X=20
 210 LET RND=INT (RND*8)+1
 220 GOTO RND*100+1000
 230 NEXT Z
 240 FOR X=1 TO 20
 250 FOR Y=1 TO 15
 260 IF A$(Y,X)=" " THEN GOSUB 3
00
 270 PRINT AT Y,X;A$(Y,X)
 280 NEXT Y
 290 NEXT X
 295 GOTO 325
 300 LET S$=CHR$ (INT (RND*26)+3
B1
 310 LET A$(Y,X)=S$
```



Illustration: Dorian Cross

```
320 RETURN
325 FOR Z=0 TO 16
330 PRINT AT Z,0;"▒"
331 PRINT AT Z,21;"▒".
332 NEXT Z
333 PRINT AT 0,23;"WORDS TO"
334 PRINT AT 1,23;"▀▀▀▀▀▀▀▀▀"
336 PRINT AT 2,23;"FIND:"
337 PRINT AT 3,23;"▀▀▀▀▀"
338 FOR Z=1 TO NW
339 PRINT AT 4+Z,22;Z;W$(Z)
340 NEXT Z
360 FOR Z=0 TO 21
365 PRINT AT 0,Z;"▒"
370 PRINT AT 16,Z;"▒"
380 NEXT Z
390 SLOW
400 IF NWTF=0 THEN GOTO 8000
401 PRINT AT 18,0;"WHERE IS THE
FIRST LETTER OF      "
410 PRINT "THE WORD (Y,X) ?
           "
415 PRINT AT 21,0;"
           "
420 INPUT Y
430 PRINT AT 21,0;Y;","
440 INPUT X
450 PRINT AT 21,0;Y;",";X
460 PRINT AT 18,0;"IN WHAT DIRE
CTION DOES THE WORD"
470 PRINT "GO (1-8) ?
           "
480 INPUT D
490 IF Y<1 OR Y>15 OR X<1 OR X>
20 THEN GOTO 400
500 FOR Z=1 TO 8
510 IF Z=D THEN GOTO 540
520 NEXT Z
530 GOTO 400
540 LET Z=0
550 PRINT AT 18,0;"WHICH NUMBER
 IN THE LIST IS THE WORD ?
           "
560 INPUT N
570 IF N<1 OR N>NW THEN GOTO 40
0
580 GOTO D*100+1800
590 STOP
1100 LET Y=Y-LENGTH
1110 LET Y=INT (RND*Y)
1120 LET X=INT (RND*X)+1
1130 FOR V=1 TO LENGTH
1140 IF A$(Y+V,X)<>" " AND A$(Y+
V,X)<>W$(Z)(V TO V) THEN GOTO 19
0
1150 LET A$(Y+V,X)=W$(Z)(V TO V)
1160 NEXT V
1170 GOTO 230
1200 LET Y=Y-LENGTH
1210 LET X=X-LENGTH
1220 LET Y=INT (RND*Y)
1230 LET X=INT (RND*X)+2+LENGTH
1240 FOR V=1 TO LENGTH
1245 IF A$(Y+V,X-V)<>" " AND A$(
Y+V,X-V)<>W$(Z)(V TO V) THEN GOT
O 190
1250 LET A$(Y+V,X-V)=W$(Z)(V TO
V)
1260 NEXT V
1270 GOTO 230
1300 LET X=X-LENGTH
1310 LET Y=INT (RND*Y)+1
1320 LET X=INT (RND*X)+2+LENGTH
1330 FOR V=1 TO LENGTH
1340 IF A$(Y,X-V)<>" " AND A$(Y,
X-V)<>W$(Z)(V TO V) THEN GOTO 19
0
1350 LET A$(Y,X-V)=W$(Z)(V TO V)
1360 NEXT V
1370 GOTO 230
1400 LET X=X-LENGTH
1410 LET Y=Y-LENGTH
1420 LET X=INT (RND*X)+2+LENGTH
1425 LET Y=INT (RND*Y)+2+LENGTH
1430 FOR V=1 TO LENGTH
1440 IF A$(Y-V,X-V)<>" " AND A$(
Y-V,X-V)<>W$(Z)(V TO V) THEN GOT
O 190
1450 LET A$(Y-V,X-V)=W$(Z)(V TO
V)
1460 NEXT V
1470 GOTO 230
1500 LET Y=Y-LENGTH
1510 LET Y=INT (RND*Y)+2+LENGTH
1520 LET X=INT (RND*X)+1
1530 FOR V=1 TO LENGTH
1540 IF A$(Y-V,X)<>" " AND A$(Y-
V,X)<>W$(Z)(V TO V) THEN GOTO 19
0
1550 LET A$(Y-V,X)=W$(Z)(V TO V)
1560 NEXT V
1570 GOTO 230
1600 LET X=X-LENGTH
1610 LET Y=Y-LENGTH
1620 LET Y=INT (RND*Y)+2+LENGTH
1630 LET X=INT (RND*Y)+1
1640 FOR V=1 TO LENGTH
1650 IF A$(Y-V,X)<>" " AND A$(Y-
V,X)<>W$(Z)(V TO V) THEN GOTO 19
0
1660 LET A$(Y-V,X)=W$(Z)(V TO V)
1670 NEXT V
1675 GOTO 230
1700 LET X=X-LENGTH
1710 LET Y=INT (RND*Y)+1
1720 LET X=INT (RND*X)
1730 FOR V=1 TO LENGTH
1740 IF A$(Y,X+V)<>" " AND A$(Y,
X+V)<>W$(Z)(V TO V) THEN GOTO 19
0
1750 LET A$(Y,X+V)=W$(Z)(V TO V)
1760 NEXT V
1770 GOTO 230
1800 LET X=X-LENGTH
```

ZX81 GAMES

from

J.K. GREYE SOFTWARE LTD

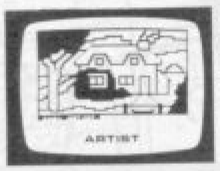
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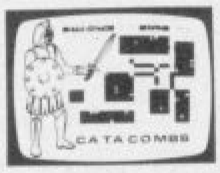


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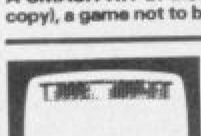




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A SMASH HIT at the ZX Microfair (most of the other software houses wanted a copy), a game not to be missed!





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If you can reach his hide-out, then he will give you the elixir of life. Travel through the jungle, the ghost town of Sham and find the secret entrance to the temple in which the wizard hides. Once in the temple you will need all your skills and determination to avoid the dangers awaiting you. You may meet the wizard in the end, but we doubt it . . .

THE FOURTH KIND
Can you manage to communicate with the extra-terrestrials and obtain from them the universal medicine for eternal life? This is not only an adventure but will test also your skills in trying to overcome what would seem to be impossible communication problems.

THE 7 CITIES OF CIBOLA
These famous cities, where the Spanish Jesuites found their gold, are situated somewhere in the South-American jungle. Their whereabouts have been lost for several centuries, and nobody has found them ever since. Can you survive in this exhausting climate and find at least some treasure? And, if you find it, will you still be strong enough to get back with your gold? There is not only the climate; indians, poisonous animals, secret religious sects and many more.

THE DOMED CITY
You are travelling through unmapped territory and your way is blocked by a giant ant heap. By a freak mutation these ants are as big as you and there is only one way open; through the ant's lair. Some ants are friendly, others are aggressive, and your weapons are not much help: your survival depends on skill, anticipation and cunning. Will you succeed?

THE TOWER OF BRASHT
One member of your expedition has been taken prisoner by the Kharrs, a cruel tribe living near the edge of civilisation. You must choose a few companions from your team, and try to get the prisoner out. Success or failure will depend on whom you choose and how they are equipped. This D&D type adventure is difficult and will take you some time to play. It can be used as a roleplaying adventure, with as many players as there can be members of the team.

THE GHOST OF RADUN
In the old, half ruined castle of Radun, a large treasure is buried. Many have tried to find it, but none have ever returned to tell the tale. It is rumoured that the treasure is guarded by a ghost, who appears when least expected, and makes sure that the treasure hunter can no longer return. This adventure is definitely not for the weak-hearted and we strongly advise not to play it after nightfall, especially not when you are alone in the house.

ADVENTURES FOR THE VERY YOUNG:
There is no longer any need for very young children to gaze wistfully at a computer they are not allowed to touch.
This new series of adventures is mainly based on graphics, but follows the traditional pattern of an adventure game. There are some elementary instructions for which a bit of help from the grown ups may be needed. If you want to see some little eyes light up . . .

PETER RABBIT AND THE MAGIC CARROT
Peter Rabbit goes on a quest for the magic carrot. It is rumoured that any rabbit taking one bite of that carrot gets an extra twenty years of life.
Peter has to go through the big forest, meets nice (and not so nice) friends, deals with a dwarf, gets help from old man oak, etc . . .
Will he get to the cave and find the magic carrot?

PETER RABBIT AND FATHER WILLOW
Father Willow has been damaged by vandals, and is now in a bit of a state. Peter Rabbit goes in pursuit of the vandals. They know and try not only to escape but to stop Peter Rabbit from following them. Luckily the latter gets help from the other trees, who heard about the story. But will he find the vandals and have them locked up?

PETER RABBIT AND THE NAUGHTY OWL
Jimmy the Owl has been unsufferable of late. The Council of the Meadows sends Peter Rabbit on an expedition to find the Master of the Owls, in order to have Jimmy taught some manners. The Master lives very far away and its quite an adventure getting there. Will Peter Rabbit come back without having seen the Master and thus Jimmy remain a nuisance?
It now transpires that the Peter Rabbit Adventures can be dangerously addictive to grown ups . . .

TUMMY DIGS
Complementing the Peter Rabbit series, a new series on Tummy Digs, a little dwarf: As with the Peter Rabbit games, the adventures are very easy (basically a maze) with graphics and it is up to the kids to invent the story themselves, after an introduction has been given.

TUMMY DIGS GOES SHOPPING
Make a shopping list, walk out of the forest and shop in town. You must find the shops, pay for your purchases and make sure that you can carry it all. Also, don't run out of money . . .

TUMMY DIGS GOES WALKING IN THE FOREST
Have a pleasant but adventurous walk in the forest. Meet some animals and plants, have a chat, and make sure you are home in time for bath and dinner.

WAR GAMES
All with full graphics of the battle field, and inclusive of manual.

KING ARTHUR
Britain in the sixth century . . . THE ANGLES AND SAXONS are marauding through the Country, leaving behind a trail of blood and devastation. In the South a man is gathering troops and fitting them out. His name is Arthur. You take his role in this fascinating wargame. Will you be able to win all the battles he won and free Britain from the plundering marauders? How good are you at commanding troops, finding the enemy and bring him to battle, sifting information, seeing through the fog of war, deploying your troops and many more similar skills?

BATTLE OF THE BULGE
Ardennes, 1944. The famous "von Rundstedt" offensive.

BATTLE OF THE RIVER PLATE
A simulation of this well known sea battle.

CONVOY
You are the commodore of a convoy under attack from submarines. Instant decisions are required and if you hesitate too long the damage might be worse. Try and locate the enemy and destroy him. Not easy . . . Again graphics, but combined with verbal information.

All these games are available for ATARI and need 16K RAM.
Some of the games will load different programs successively and are thus much larger than 16K.
All C.P.S. Games, except those for children, are priced at £9.50. The Peter Rabbit and Tummy Digs games are now £4.50.

C.P.S. 14 Britton St., London EC1M 5NQ (01-251 3090)

```
1810 LET Y=Y-LENGTH
1820 LET Y=INT (RND*Y)
1830 LET X=INT (RND*X)
1840 FOR V=1 TO LENGTH
1850 IF A$(Y+V,X+V)<>" " AND A$(
Y+V,X+V)<>W$(Z)(V TO V) THEN GOT
O 190
1860 LET A$(Y+V,X+V)=W$(Z)(V TO
V)
1870 NEXT V
1875 GOTO 230
1900 IF (Y-1)+LENGTH>15 THEN GOT
O 400
1905 LET Y=Y-1
1910 FOR V=1 TO LENGTH
1920 IF A$(Y+V,X)<>W$(N)(V TO V)
 THEN GOTO 400
1930 NEXT V
1940 FOR V=1 TO LENGTH
1950 LET Q=CODE (W$(N)(V TO V))
1955 LET Q=Q+128
1960 LET W$(N)(V TO V)=CHR$ (Q)
1970 PRINT AT Y+V,X;CHR$ (Q)
1975 PRINT AT N+4,22+V;CHR$ (Q)
1980 NEXT V
1985 LET NWTF=NWTF-1
1990 GOTO 400
2000 IF (Y-1)+LENGTH>15 OR (X+1)
-LENGTH<1 THEN GOTO 400
2010 LET Y=Y-1
2020 LET X=X+1
2030 FOR V=1 TO LENGTH
2035 IF A$(Y+V,X-V)<>W$(N)(V TO
V) THEN GOTO 400
2040 NEXT V
2045 FOR V=1 TO LENGTH
2050 LET Q=CODE (W$(N)(V TO V))
2055 LET Q=Q+128
2060 LET W$(N)(V TO V)=CHR$ (Q)
2070 PRINT AT Y+V,X-V;CHR$ (Q)
2075 PRINT AT N+4,22+V;CHR$ (Q)
2080 NEXT V
2085 LET NWTF=NWTF-1
2090 GOTO 400
2100 IF (X+1)-LENGTH<1 THEN GOTO
 400
2110 LET X=X+1
2120 FOR V=1 TO LENGTH
2130 IF A$(Y,X-V)<>W$(N)(V TO V)
 THEN GOTO 400
2140 NEXT V
2145 FOR V=1 TO LENGTH
2150 LET Q=CODE (W$(N)(V TO V))
2155 LET Q=Q+128
2160 LET W$(N)(V TO V)=CHR$ (Q)
2170 PRINT AT Y,X-V;CHR$ (Q)
2175 PRINT AT N+4,22+V;CHR$ (Q)
2180 NEXT V
2185 LET NWTF=NWTF-1
2190 GOTO 400
2200 IF (X+1)-LENGTH<1 OR (Y+1)-
LENGTH<1 THEN GOTO 400
2205 LET Y=Y+1
2210 LET X=X+1
2220 FOR V=1 TO LENGTH
2230 IF A$(Y-V,X-V)<>W$(N)(V TO
V) THEN GOTO 400
2240 NEXT V
2245 FOR V=1 TO LENGTH
2250 LET Q=CODE (W$(N)(V TO V))
2255 LET Q=Q+128
2260 LET W$(N)(V TO V)=CHR$ (Q)
2270 PRINT AT Y-V,X-V;CHR$ (Q)
2275 PRINT AT N+4,22+V;CHR$ (Q)
2280 NEXT V
2285 LET NWTF=NWTF-1
2290 GOTO 400
2300 IF (Y+1)-LENGTH<1 THEN GOTO
 200
2310 LET Y=Y+1
2320 FOR V=1 TO LENGTH
2330 IF A$(Y-V,X)<>W$(N)(V TO V)
 THEN GOTO 400
2340 NEXT V
2345 FOR V=1 TO LENGTH
2350 LET Q=CODE (W$(N)(V TO V))
2355 LET Q=Q+128
2360 LET W$(N)(V TO V)=CHR$ (Q)
2370 PRINT AT Y-V,X;CHR$ (Q)
2375 PRINT AT N+4,22+V;CHR$ (Q)
2380 NEXT V
2385 LET NWTF=NWTF-1
2390 GOTO 400
2400 IF (Y+1)-LENGTH<1 OR (X-1)+
LENGTH>20 THEN GOTO 400
2405 LET Y=Y+1
2410 LET X=X-1
2420 FOR V=1 TO LENGTH
2430 IF A$(Y-V,X+V)<>W$(N)(V TO
V) THEN GOTO 400
2440 NEXT V
2445 FOR V=1 TO LENGTH
2450 LET Q=CODE (W$(N)(V TO V))
2455 LET Q=Q+128
2460 LET W$(N)(V TO V)=CHR$ (Q)
2470 PRINT AT Y-V,X+V;CHR$ (Q)
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2485 LET NWTF=NWTF-1
2490 GOTO 400
2500 IF (X-1)+LENGTH>20 THEN GOT
O 400
2510 LET X=X-1
2520 FOR V=1 TO LENGTH
2530 IF A$(Y,X+V)<>W$(N)(V TO V)
 THEN GOTO 400
2540 NEXT V
2545 FOR V=1 TO LENGTH
2550 LET Q=CODE (W$(N)(V TO V))
2555 LET Q=Q+128
2560 LET W$(N)(V TO V)=CHR$ (Q)
2570 PRINT AT Y,X+V;CHR$ (Q)
2575 PRINT AT N+4,22+V;CHR$ (Q)
2580 NEXT V
2585 LET NWTF=NWTF-1
2590 GOTO 400
2600 IF (X-1)+LENGTH>20 OR (Y-1)
+LENGTH>20 THEN GOTO 400
2605 LET X=X-1
2610 LET Y=Y-1
2620 FOR V=1 TO LENGTH
2630 IF A$(Y+V,X+V)<>W$(N)(V TO
V) THEN GOTO 400
2640 NEXT V
2645 FOR V=1 TO LENGTH
2650 LET Q=CODE (W$(N)(V TO V))
2655 LET Q=Q+128
2660 LET W$(N)(V TO V)=CHR$ (Q)
2670 PRINT AT Y+V,X+V;CHR$ (Q)
2675 PRINT AT N+4,22+V;CHR$ (Q)
2680 NEXT V
2685 LET NWTF=NWTF-1
2690 GOTO 400
8000 PRINT AT 18,0;"WELL DONE. A
NOTHER GO?
                               "

8010 PRINT AT 21,0;"             "
8020 IF INKEY$="" THEN GOTO 8020
8030 IF INKEY$( TO 1)<>"Y" AND I
NKEY$( TO 1)<>"N" THEN GOTO 8020
8040 IF INKEY$( TO 1)="Y" THEN G
OTO 5
8050 CLS
8060 STOP
9000 PRINT
9010 PRINT "  IN THIS GAME,YOU T
YPE IN SOME"
9020 PRINT "WORDS (1-9) ALL OF T
HE SAME "
9030 PRINT "LENGTH (2-9 LETTERS)
.THE "
9040 PRINT "COMPUTER WILL THEN H
IDE THEM "
9050 PRINT "IN A 15 BY 20 MATRIX
,JUMBLED UP"
9060 PRINT "WITH OTHER LETTERS.Y
OU HAVE TO"
9070 PRINT "FIND THEM,AND TELL T
HE COMPUTER"
9080 PRINT "THREE THINGS:"
9090 PRINT "  A: THE COORDINATES
 OF THE "
9100 PRINT "     FIRST LETTER."
9110 PRINT "  B: THE DIRECTION O
F THE WORD"
9120 PRINT "  C: THE NUMBER OF T
HE WORD"
9130 PRINT
9140 PRINT "DIRECTION:      4 5 6
"
9150 PRINT "                 ***"
9160 PRINT "                 3*X*7
"
9170 PRINT "                 ***"
9180 PRINT "                 2 1 8
"
9190 FOR S=1 TO 200
9200 NEXT S
9210 CLS
9220 RETURN
9990 SAVE "WORD SEARCH█"
9999 GOTO 5
```

SEIKOSHA GP–100A GRAPHIC PRINTER

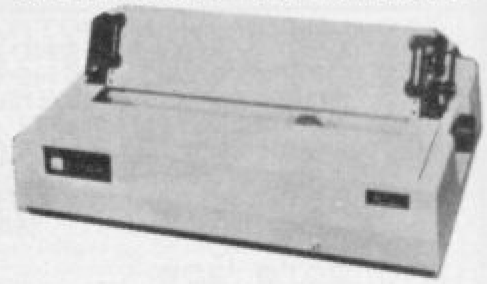
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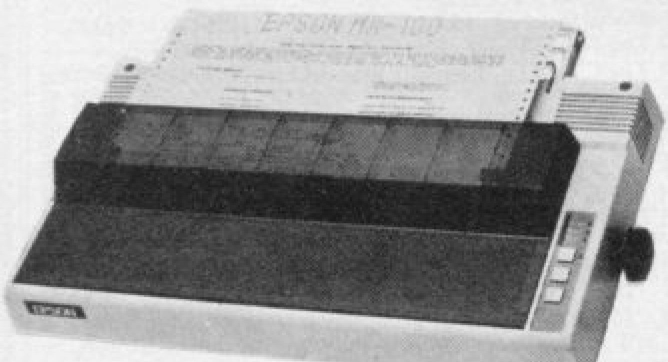
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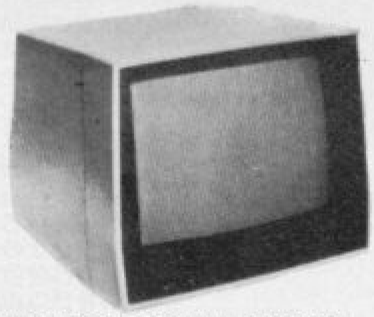
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MX100–3
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MX82 F/T
PRICE £339 + VAT + £4.50 Carr.

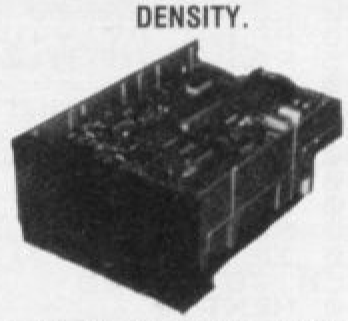
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D1200	D	1200 mAH	£2.05
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Illustration: Terry Rogers

MINING COLONY

Out in the depths of darkest space there is an asteroid mining colony plundering the riches of the universe. The miners dig up minerals which are turned into products like solar powered washing machines back on Earth.

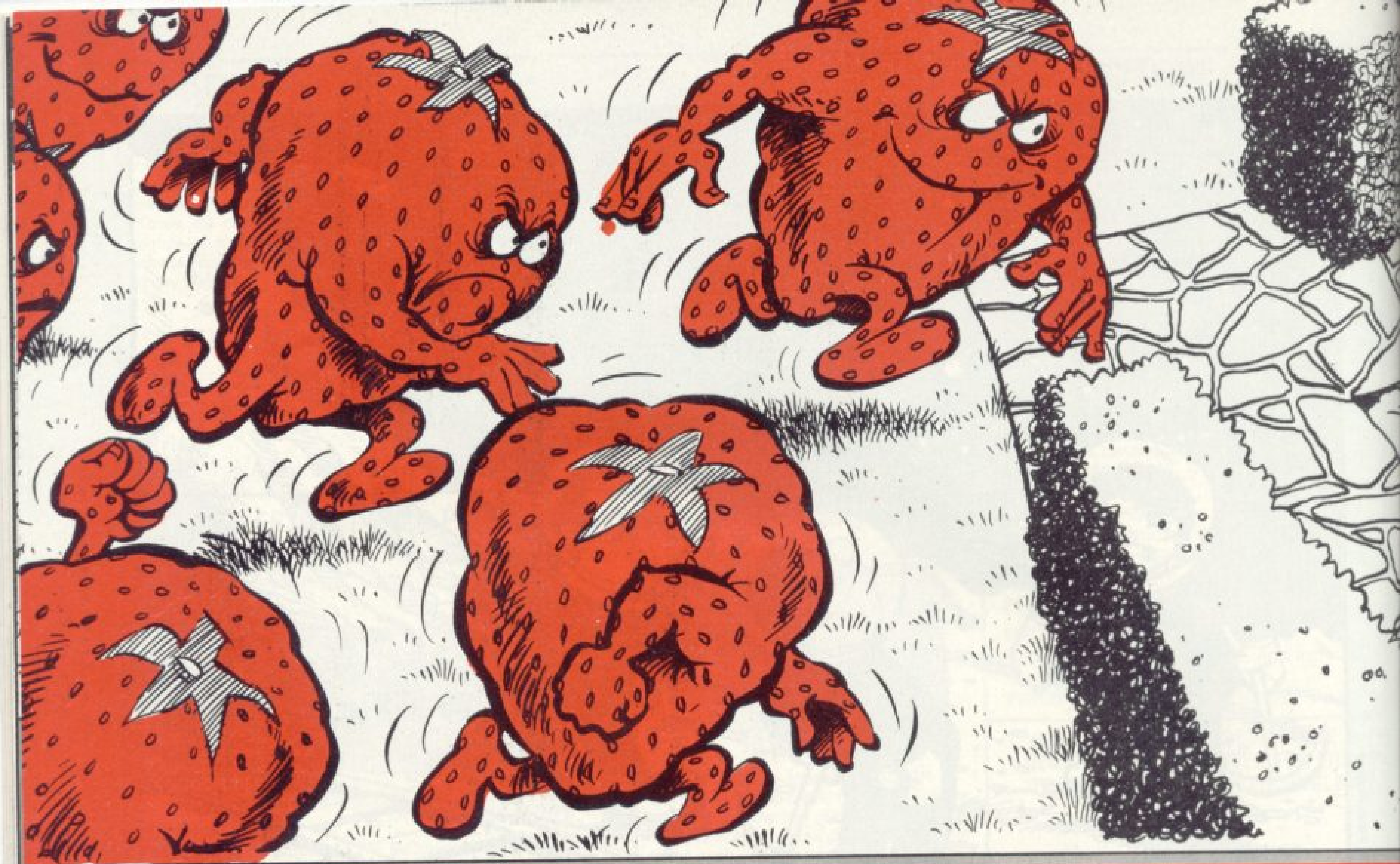
But the colony is running low on supplies. The robot ships are on their way — but an asteroid field blocks their flightpath. Your job is to act as an air traffic controller and guide the supply ships through the asteroids and down on to the planet.

The ships are controlled from Atom flight command by using the CTRL key to move left and the SHIFT key to move right.

RUNS ON AN UNEXPANDED ACORN ATOM

BY ROBERT CAMPBELL

```
10 CLEAR 0
11 IN."INSTRUCTIONS(Y=1;
   2=NO)"V;IF V=1 G.300
15 B=32928
16 IN."DIFFICULTY 1-6"F
17 CLEAR 0
18 IF F>6 G. 16
20 F. I=1 TO F;A=A.R.%32+33249
30 ?A=42
35?B=64
36 ?B=102
37 ?B=64
38 IF ?(B+32)=42 G.100
39 IF B=32960 G. 200
40 N.
45 F.I=1 TO 6;WAIT;N.
50 P.$10$24
60 LET C=?#B001
70 IF C=127 THEN LET B=B+1
80 IF C=191 B=B-1
81 IF B<32928 B=32928
85 ?B=102
86 IF ?B+32=42 G.100
90 G.20
100 P."YOU CRASHED"';LINK#FFE3;RUN
200 P.$12$7$7"YOU DID IT THE MINERS THANK YOU";E.
300 P."FERRY"'"------"'''
310 P." A MINING COLONY HAS BEEN SET "'"UP IN AN ASTEROID "
320 P."FIELD IT"'"IS YOUR JOB TO CONTROL THE "'
330 P."ROBOT SHIPS THROUGH THE ASTEROID"'"FIELD TO SUPPLY "
340 P."THEM"'"CTRL-LEFT"'"SHIFT-RIGHT"''
350 P."Press any key to run"';LI. #FFE3;G.15
```



Wild Strawberries

You won't get a chance to pick your own when the Wild Strawberries get on your trail. This bunch of furious fruits are not the sort to be covered in cream and devoured. They roam the vegetable patch in search of unwary gardeners — who will come to a sticky end.

You use your Atari joystick to guide your workman around the different levels of a garden on a network of ladders and pathways. The gardener has to eliminate the rampaging strawberries by quickly digging a pit to trap the advancing fruit.

```
10 DATA 0,0,0,0,0,0,0,0
12 DATA 0,0,0,0,0,129,195,0
14 DATA 0,0,0,0,129,195,231,0
16 DATA 66,102,126,0,231,231,231,0
18 DATA 126,126,126,0,231,231,231,0
20 DATA 255,129,255,129,255,129,255,129
22 DATA 255,129,255,129,255,129,255,129
24 DATA 255,129,255,129,255,129,255,129
26 DATA 0,0,0,129,255,129,255,129
28 DATA 0,36,24,126,165,165,255,90
30 DATA 36,24,126,165,165,165,255,0
32 DATA 60,126,165,165,165,165,255,90
34 DATA 0,0,36,24,126,165,255,90
36 DATA 0,0,0,36,24,126,255,90
38 DATA 0,0,0,0,36,24,255,0
40 DATA 0,0,0,0,0,24,60,0
42 DATA 0,0,0,0,102,189,126,60
44 DATA 24,60,90,60,24,60,36,36
46 DATA 12,28,8,62,94,156,148,148
48 DATA 204,92,72,60,28,28,20,20
50 DATA 48,56,16,124,122,57,41,43
52 DATA 51,58,18,60,56,56,40,40
54 DATA 255,255,0,255,0,0,0,0
56 DATA 2,6,10,14,18
65 FOR A=0 TO 511:POKE 10240+A,PEEK(57344+A):NEXT A
70 FOR A=0 TO 127:READ B:POKE 10240+A,B:NEXT A
75 FOR A=0 TO 55:READ B:POKE 10448+A,B:NEXT A
80 DIM A(15),B(15),C(15),D(3),E(3),F(3),G(3),H(3),I(3)
82 FOR A=1 TO 15:A(A)=0:B(A)=0:C(A)=0:NEXT A
84 FOR A=1 TO 3:D(A)=0:E(A)=0:F(A)=0:G(A)=0:H(A)=0:I(A)=0:NEXT A
86 A(7)=1:A(11)=-1:B(14)=-1:B(13)=1:C(7)=62:C(11)=60:C(14)=59:C(13)=59
88 D(1)=0:E(1)=2:F(1)=1:X=19:Y=22:P=1:M=3:J=3:V=600
100 GRAPHICS 17:POKE 756,40
102 COLOR 59:PLOT 1,0:DRAWTO 3,0:POSITION 6,0:PRINT #6;"SCORE ";S
104 SETCOLOR 0,12,6:SETCOLOR 1,0,4:SETCOLOR 2,3,4:SETCOLOR 3,6,6:SETCOLOR 4,14,0
106 GOSUB 200:IF HI=0 THEN GOTO 1100
108 GOTO 390
200 COLOR 4:RESTORE 56:FOR A=1 TO 5:READ B
210 PLOT 0,B+1:DRAWTO 19,B+1:NEXT A
220 COLOR 96:PLOT 19,23:DRAWTO 0,23
230 A=2:D=INT(RND(1)*3+4)
240 B=INT(RND(1)*18+1):IF B=C THEN 240
250 COLOR 136:PLOT B,A:C=B:COLOR 133:PLOT B,A+1:D=D-1
260 LOCATE B,A+1,F:IF F=96 THEN 300
270 IF F=4 AND RND(1)<0.45 THEN COLOR 135:PLOT B,A:GOTO 240
280 IF F=4 THEN COLOR 134:PLOT B,A:COLOR 133
290 A=A+1:PLOT B,A:GOTO 260
300 COLOR 135:PLOT B,A:FOR E=1 TO D
310 RESTORE 56:B=INT(RND(1)*18+1):C=INT(RND(1)*5+1)
320 FOR F=1 TO C:READ G:NEXT F
330 FOR G1=-1 TO 1:LOCATE B+G1,G,F:IF F<>32 THEN POP :GOTO 310
335 NEXT G1
340 COLOR 136:PLOT B,G:COLOR 133:PLOT B,G+1
350 LOCATE B,G+1,F:IF F=96 OR (F=4 AND RND(1)<0.45) THEN COLOR 135:PLOT B,G:COLO
R 133:GOTO 380
360 IF F=4 THEN COLOR 134:PLOT B,G:COLOR 133
370 G=G+1:PLOT B,G:GOTO 350
380 NEXT E:RETURN
390 COLOR 169:PLOT D(1),E(1):COLOR 60:PLOT X,Y
400 FOR B=1 TO P:IF D(B)=-10 THEN 510
410 IF I(B)=1 THEN 750
420 D(B)=D(B)+F(B):IF D(B)>19 OR D(B)<0 THEN F(B)=-F(B):D(B)=D(B)+F(B):GOTO 420
430 E(B)=E(B)+G(B):LOCATE D(B),E(B)+1,F:LOCATE D(B),E(B),G
440 IF G=169 THEN F(B)=-F(B):G(B)=-G(B):D(B)=D(B)+F(B):E(B)=E(B)+G(B):G=H(B):GOT
O 480
450 IF F=0 THEN E(B)=E(B)+1:I(B)=1:G(B)=1:GOTO 460
```



Illustration: Terry Rogers

RUNS ON AN ATARI 400

IN 16K WITH JOY STICKS

BY STEVEN PERKINS

The strawberries fall into the pit — but there's a big snag. The strawberries will only stay trapped for a few seconds — and to finish them off the gardener must push them through the holes so they will fall to the bottom level of the garden and find themselves in a real jam!

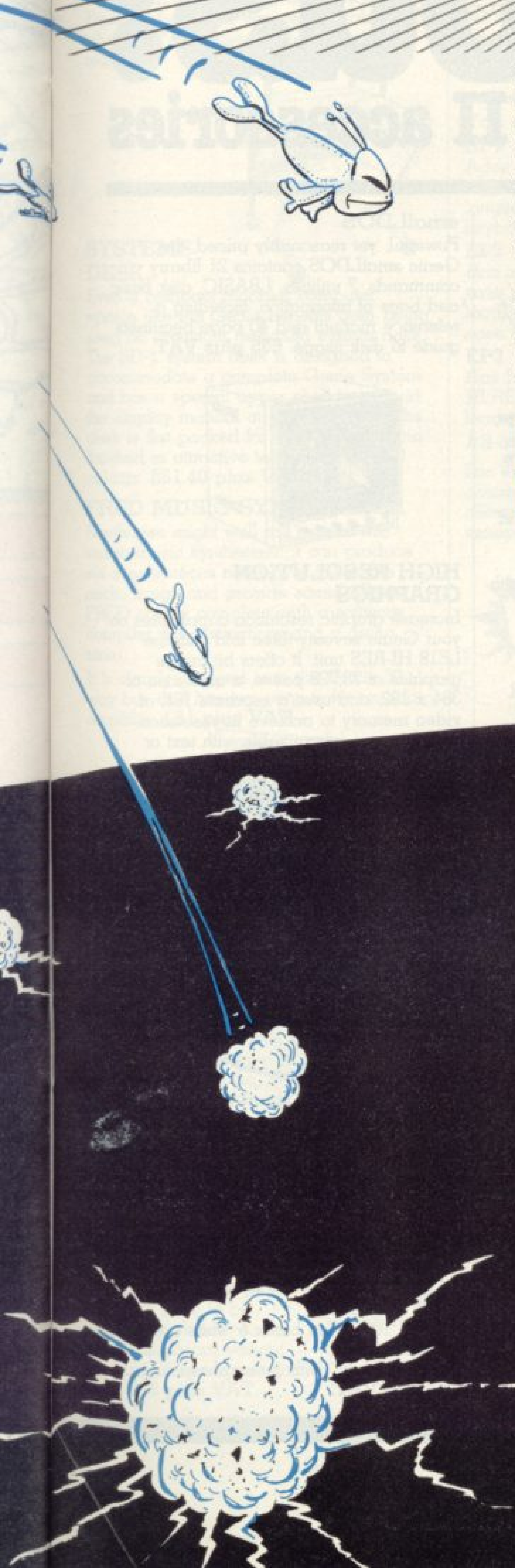
Each new frame provides a different network of ladders and paths and more strawberries. The game gets harder and harder as you become more skilled at picking off the deadly fruit. You'll eventually come across a really tough breed of strawberry which can only be killed by pushing from a greater height. Strawberries and cream will never be the same!

```
455 IF F(4 THEN COLOR 4:PLOT D(B),E(B)+1
460 COLOR 169:PLOT D(B),E(B):COLOR H(B):PLOT D(B)-F(B),E(B)-G(B)
470 H(B)=G:IF X=D(B) AND Y=E(B) THEN 800
480 IF G=136 THEN A=INT(RND(1)*3+1):F(B)=(A=1)-(A=2):G(B)=(A=3):GOTO 510
490 IF G=135 THEN A=INT(RND(1)*3+1):F(B)=(A=1)-(A=2):G(B)=-(A=3):GOTO 510
500 IF G=134 THEN A=INT(RND(1)*4+1):F(B)=(A=1)-(A=2):G(B)=(A=3)-(A=4)
510 NEXT B:GOTO V
600 E=STICK(0):IF STRIG(0)=0 THEN 700
610 F=A(E):G=B(E):X=X+F:Y=Y+G:IF F()0 THEN Z=F
620 IF F=0 AND G=0 THEN 400
630 IF X(0 OR X)19 THEN X=X-F:GOTO 400
640 LOCATE X,Y,A:IF A(5 AND A)0 OR A=96 OR A=169 THEN X=X-F:Y=Y-G:GOTO 400
650 SOUND 1,250,1,10:COLOR C(E):PLOT X,Y:COLOR R:PLOT X-F,Y-G:H=E
660 R=A:LOCATE X,Y+1,A:IF A=0 OR A=32 THEN 1050
670 SOUND 1,0,0,0:GOTO 400
700 IF X+Z(0 OR X+Z)19 THEN 400
705 LOCATE X+Z,Y+1,A:IF A=169 THEN 900
710 IF A)4 OR A(1 THEN 400
720 LOCATE X+Z,Y,D:IF D()32 THEN 400
730 COLOR C(H)+1:PLOT X,Y:SOUND 2,150,12,15:FOR C=1 TO 10:NEXT C
740 COLOR C(H):PLOT X,Y:COLOR A-1:PLOT X+Z,Y+1:SOUND 2,0,0,0:GOTO 400
750 IF RND(1))0.2 THEN 770
760 COLOR 169:E(B)=E(B)-1:PLOT D(B),E(B):COLOR 4:PLOT D(B),E(B)+1:I(B)=0:G(B)=0:
GOTO 510
770 COLOR 170:PLOT D(B),E(B):SOUND 3,20,6,10:FOR C=1 TO 10:NEXT C
780 COLOR 169:PLOT D(B),E(B):SOUND 3,0,0,0:GOTO 510
800 SOUND 2,240,4,13:COLOR 170:PLOT X,Y:GOSUB 890
810 FOR A=0 TO 2:SOUND 2,250-A*10,4,15-A*2:COLOR 171-A:PLOT X,Y:GOSUB 890:NEXT A
820 FOR A=0 TO 3:SOUND 2,220-A*10,4,9-A*2:COLOR 172+A:PLOT X,Y:GOSUB 890:NEXT A
830 SOUND 2,0,0,0:COLOR R:PLOT X,Y:GOSUB 890
840 M=M-1:IF M=0 THEN 1080
850 O=0:IF P=4 THEN P=1:J=J+3
860 ? #6;"}":POSITION 6,0:? #6;"SCORE ";S:COLOR 59:PLOT 1,0:DRAWTO M,0:GOSUB 200
870 FOR A=1 TO 3:RESTORE 56:B=INT(RND(1)*5+1):FOR C=1 TO B:READ D:NEXT C:E(A)=D:
H(A)=32
880 F(A)=1:G(A)=0:I(A)=0:D(A)=(RND(1))0.5)*19:NEXT A:X=19:Y=22:R=32:GOTO 390
890 FOR C=1 TO 30:NEXT C:RETURN
900 FOR F=1 TO P:IF D(F)=X+Z AND E(F)=Y+1 THEN 902
901 NEXT F
902 IF I(F)=0 THEN 400
905 SOUND 3,50,12,15:COLOR C(H)+1:PLOT X,Y:FOR B=1 TO 20:NEXT B
910 COLOR C(H):PLOT X,Y:A=4:C=X+Z:FOR B=1 TO 20:SOUND 3,10+B,8,15
920 LOCATE C,Y+B+1,E:IF (E)0 AND E(5) OR E=133 OR E=96 THEN 960
930 IF E=0 THEN E=4
940 COLOR 169:PLOT C,Y+B+1:COLOR A:PLOT C,Y+B:FOR D=1 TO 10:NEXT D:A=E
950 NEXT B
960 IF B(J THEN 1020
970 S=S+B*10:O=O+1:COLOR 186:PLOT C,Y+B
980 FOR E=250 TO 1 STEP -10:SOUND 3,B,8,15:NEXT E:SOUND 3,0,0,0
990 COLOR A:PLOT C,Y+B:D(F)=-10:POSITION 6,0:PRINT #6;"SCORE ";S
1000 IF O=P THEN P=P+1:GOTO 850
1010 GOTO 400
1020 SOUND 3,0,0,0:I(F)=0:D(F)=C:E(F)=Y+B:H(F)=A:G(F)=0:GOTO 400
1050 A=R:FOR B=1 TO 22:COLOR 59:LOCATE X,Y+1,E:IF E=96 OR E=133 OR E=169 OR (E)0
 AND E(5) THEN 1070
1060 Y=Y+1:PLOT X,Y:COLOR A:PLOT X,Y-1:SOUND 1,40+Y*4,14,10:A=E:NEXT B
1070 SOUND 1,0,0,0:R=A:GOTO 400
1080 IF S)HI THEN HI=S
1090 Z=-1:S=0:H(B)=R:R=32
1100 V=1220:X=99:POSITION 0,0:PRINT #6;" WILD STRAWBERRIES ":GOSUB 1200
1110 POSITION 0,0:PRINT #6;"   BY S J PERKINS   ":GOSUB 1200
1120 POSITION 0,0:PRINT #6;"   HI SCORE ";INT(HI);"     ":GOSUB 1200
1130 POSITION 0,0:PRINT #6;"PRESS TRIG TO START ":GOSUB 1200:GOTO 1100
1200 FOR O=1 TO 25:IF STRIG(0)=0 THEN O=0:HI=HI+1.0E-03:GOTO 82
1210 GOTO 400
1220 NEXT O:RETURN
```



Illustration: Dorian Cross

KAMIKAZE



Some aliens just don't care. They'll hurl themselves out of their spaceships and hurtle down at you with no regard for life or limb. They smash into the ground and explode violently sending earthquake strength shockwaves rumbling out around them.

You have to dodge the explosions and at the same time destroy aliens by catching them as they drop from their mothership in a continuous stream.

You can send the ugly aliens back where they came from if you manage to destroy enough of them. But if you fail the mothership will land and colonise your planet.

You have three lives to do battle with the aliens and the explosions generated by the falling hoardes increases proportionally with the level of difficulty you choose.

Your base is controlled by using the 'Z' key to move left and '?' to move right.

Can you save the earth! Ooops, there goes another one . . .

RUNS ON A 40 COLUMN PET IN 6K

BY ROBERT CASTLE

```
1 K=0
2 REM***COPYRIGHT R.CASTLE 16.7.82***
3 PRINT"□":C=32787+(W*40):A=33627:X=32928+(W*40):Z=0     :GOTO1800
5 CR=3:W=1
6 PRINT"□":C=32787+(W*40):A=33627:X=32928+(W*40)
7 PRINT"□"
10 PRINT"□"
20 POKEA,160:POKEA-1,233:POKEA+1,223
90 PRINT"[illegible]"
100 PRINT"[illegible]SCORE";Z"BASES";CR"LEVEL";W"H
IGH";K
102 REM***THE SPACE SHIP***
105 POKEC,98:POKEC-1,98:POKEC+1,98:POKEC-2,98:POKEC+2,98:POKEC+3,98:POKEC-3,98
106 POKEC+4,98:POKEC-4,98:POKEC+5,98:POKEC-5,98:POKEC+6,98:POKEC-6,98
107 POKEC+7,98:POKEC-7,98:POKEC+8,98:POKEC-8,98:POKEC-9,98:POKEC+9,98
108 POKEC+10,98:POKEC-10,98:POKEC+11,98:POKEC-11,98:POKEC-12,98:POKEC+12,98
110 POKEC+40,160:POKEC+41,160:POKEC+39,160:POKEC+42,160:POKEC+38,160
111 POKEC+43,160:POKEC+44,160:POKEC+37,160:POKEC+45,160:POKEC+36,160
112 POKEC+46,160:POKEC+47,160:POKEC+35,160:POKEC+48,160:POKEC+34,160
113 POKEC+49,160:POKEC+33,160:POKEC+32,160:POKEC+31,160:POKEC+30,160
114 POKEC+50,160:POKEC+51,160:POKEC+52,160:POKEC+53,160:POKEC+29,160
115 POKEC+28,160:POKEC+27,160:POKEC+26,98 :POKEC+54,98
116 POKEC+80,160:POKEC+81,209:POKEC+79,209:POKEC+82,160:POKEC+78,160
117 POKEC+83,209:POKEC+84,160:POKEC+77,209:POKEC+85,209:POKEC+76,160
118 POKEC+86,160:POKEC+87,209:POKEC+75,209:POKEC+88,160:POKEC+74,160
119 POKEC+89,209:POKEC+73,209:POKEC+72,160:POKEC+71,209:POKEC+70,160
120 POKEC+90,160:POKEC+91,209:POKEC+92,160:POKEC+93,160:POKEC+69,209
121 POKEC+68,160:POKEC+67,160:POKEC+66,160:POKEC+ 94,160
122 POKEC+65,160:POKEC+64,98 :POKEC+95,160:POKEC+ 96,98
123 POKEC+120,160:POKEC+121,160:POKEC+119,160:POKEC+122,160:POKEC+118,160
124 POKEC+123,160:POKEC+124,160:POKEC+117,160:POKEC+125,160:POKEC+116,160
125 POKEC+126,160:POKEC+127,160:POKEC+115,160:POKEC+128,160:POKEC+114,160
126 POKEC+129,160:POKEC+113,160:POKEC+112,160:POKEC+111,160:POKEC+110,160
127 POKEC+130,160:POKEC+131,160:POKEC+132,160:POKEC+133,160:POKEC+109,160
128 POKEC+108,160:POKEC+107,160:POKEC+106,160:POKEC+134,160:POKEC+137,160
129 POKEC+105,160:POKEC+104,160:POKEC+135,160:POKEC+136,160:POKEC+103,160
130 POKEC+201,160:POKEC+203,160:POKEC+205,160:POKEC+207,160:POKEC+209,160
131 POKEC+211,160:POKEC+213,160:POKEC+215,160:POKEC+217,160:POKEC+199,160
132 POKEC+197,160:POKEC+195,160:POKEC+193,160:POKEC+191,160:POKEC+189,160
133 POKEC+187,160:POKEC+185,160:POKEC+183,160
140 POKEC+223,226:POKEC+225,160:POKEC+227,160:POKEC+229,209:POKEC+231,209
141 POKEC+233,209:POKEC+235,209:POKEC+237,209:POKEC+239,209:POKEC+241,209
142 POKEC+243,209:POKEC+245,209:POKEC+247,209:POKEC+249,209:POKEC+251,209
143 POKEC+253,160:POKEC+255,160:POKEC+257,226:POKEC+249,209:POKEC+251,209
144 POKEC+265,226:POKEC+267,160:POKEC+269,160:POKEC+271,160
145 POKEC+273,160:POKEC+275,160:POKEC+277,160:POKEC+279,160:POKEC+281,160
146 POKEC+283,160:POKEC+285,160:POKEC+287,160:POKEC+289,160:POKEC+291,160
147 POKEC+293,160:POKEC+295,226
148 POKEC+307,226:POKEC+309,226:POKEC+311,226:POKEC+333,226
149 POKEC+313,226:POKEC+315,226:POKEC+317,226:POKEC+319,226:POKEC+321,226
150 POKEC+323,226:POKEC+325,226:POKEC+327,226:POKEC+329,226:POKEC+331,226
218 B=X:IFPEEK(C+440)=102ORPEEK(C+400)=102             THEN1500:E$=""
219 POKEA,160:POKEA-1,233:POKEA+1,223
220 IF     C+320 <32767THEN1700
225 BB=INT(19*RND(1))
226 IFBB=0THEN225
230 FORB=X     TO(B+(BB*2))
235 POKEB,216:POKEB-1,46:POKEB+1,46:POKEB-2,32
240 POKE151,20
245 GETE$:IFE$=""THEN270
250 IFE$="Z"THEN500
255 IEE$="?"THEN600
270 NEXTB
```

BUSINESS SOFTWARE

Specifically written for the Genie II computer, with disks and a suite of packages from the renowned house TRIDATA. The suite includes SALES LEDGER, PURCHASE LEDGER, PAYROLL and STOCK CONTROL. Each package is a very reasonable **£175 plus VAT.** Full details are available on request.



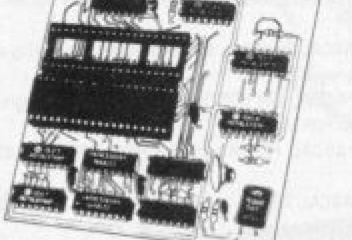
SYSTEMS DESK

Even a compact modular computer system like the Genie benefits from being used on a custom designed system desk. The SD-1 system desk is designed to accommodate a complete Genie System and has a special upper shelf to support the display monitor at the best level. The desk is flat packed for easy delivery and finished in attractive teak and charcoal colours. **£81.40 plus VAT.**

FRED MUSIC SYNTHESISER

Beethoven might well roll over at this stereo music synthesiser: it can produce six simultaneous notes over the whole audio range and provide sound effects. FRED comes complete with a software compiler, full instructions and a demo tune.

It is simply plugged onto the Genie 50 way bus and has two outputs for an audio amplifier. **£51 plus VAT.**



EG 3203 TANDY-BASHER!

If you are a TANDY user, read on! The EG 3203 is bus converted to allow Genie peripherals to be used with Tandy Model I computers. **£18.40 plus VAT.**

(Just in case there might be a few strange souls who want to convert in the opposite direction, there is the 50/40 converter which generates a Tandy compatible 40 way bus from a Genie.) **£34 plus VAT.**

EG 3016 PARALLEL PRINTER INTERFACE

The EG 3016 is a simpler interface allowing a Centronics parallel compatible printer (EG 603, EG 3085) to be connected directly to the Genie keyboard without the need for an expander box. **£38 plus VAT.**



BUS EXTENDER

A most useful accessory, allows two bus using devices to be connected simultaneously to the Genie - when using the Hi Res and expander for instance. **£21 plus VAT.**

EP1, EP2, EP3

Genie I and Genie II have ROMS offering 13.5K Microsoft BASIC, of which the final 1.5K BASIC are custom written extensions contained in EPROMs.

You can change these as follows:

EP1

Adds all Genie 1 software facilities to other Genies, lower case driver, machine language monitor, renumber facility, keyboard repeat and screen print.

EP2

Has improved M.L. monitor, can load and save programs. Defined function keys (list, load, save etc.) for Genie II and lower case driver.

EP3

Has HI-RES driver software with 10 extra HI-RES commands which prevent need to load HI-RES software from tape.

All at £12 plus VAT.

For Video Genie Systems, the LE-19 connects direct to the Genie bus and allows one of these EPROMs to be fitted externally. **£26.50 plus VAT.**



NEW! A 64K CP/M computer for less than £1,000!

CP/Genie with single disk drive has 64K RAM, 13.5K ROM, comes complete with a 12" monitor, 64 x 16 screen format and operates under CP/M 2.2 supplied with machine. **£999 plus VAT.**

The dual disk version will cost **£1,175 plus VAT.**

Both are compatible with existing Genie I software and are supplied with the Genie SmallDOS. A breakthrough for Lowe Electronics customers that should not be missed.

SPECIAL TECHNICAL GENIE HOT – LINE ON 0629 4995

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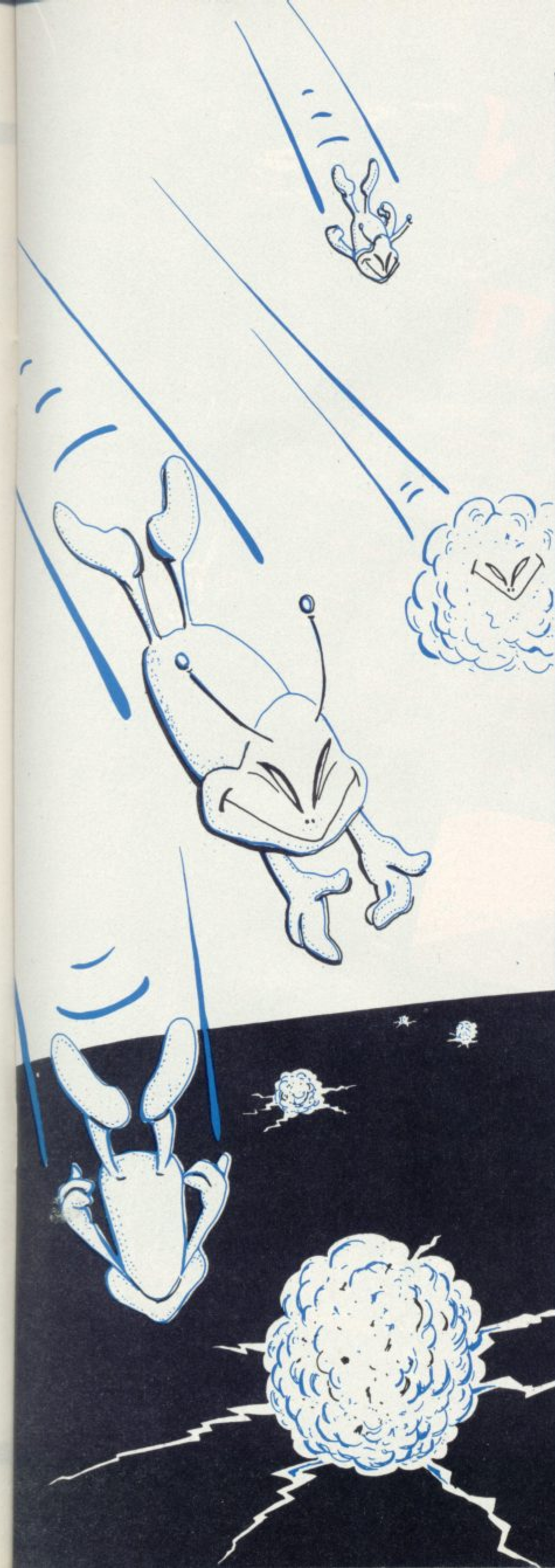
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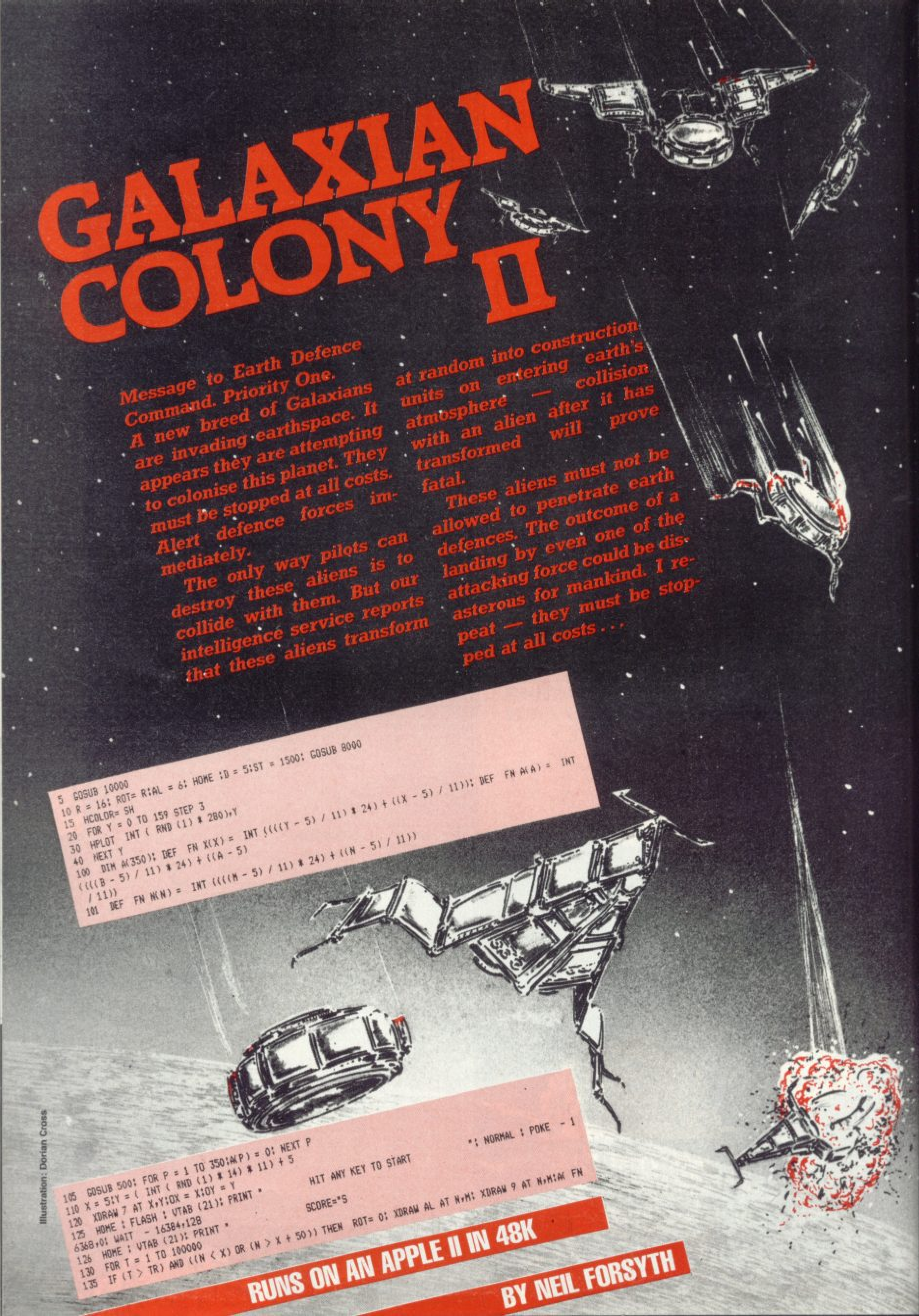
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```
275 POKEB,32:POKEB-1,32:POKEB-2,32
280 POKEB,88
285 FORD=1TO30
290 B=B+40:POKEB-40,32:POKEB,88
295 IFPEEK(B+40)=102THEN1000
300 IFPEEK(B+40)=160THEN1100
305 POKE151,20
310 GETE$:IFE$=""THEN330
315 IFE$="Z"THEN550
320 IFE$="?"THEN650
325 IFE$=" "THEN750
330 NEXTD
335 GOTO218
500 IFA<=33608THEN270
505 A=A-1:POKEA+2,32:POKEA,160:POKEA+1,223:POKEA-1,233:GOTO270
550 IFA<=33608THEN330
555 A=A-1:POKEA+2,32:POKEA,160:POKEA+1,223:POKEA-1,233:GOTO330
600 IFA>=33647THEN270
605 A=A+1:POKEA-2,32:POKEA,160:POKEA+1,223:POKEA-1,233:GOTO270
650 IFA>=33647THEN330
655 A=A+1:POKEA-2,32:POKEA,160:POKEA+1,223:POKEA-1,233:GOTO330
750 FF=A-40:POKEFF,34:POKEA,160:POKEA-1,233:POKEA+1,223
755 FORH=1TO20
760 FF=FF-40:POKEFF+40,32:POKEFF,34
765 IFPEEK(FF-40)=88THEN800
770 IFPEEK(FF-40)=160THEN1350
775 NEXTH
790 POKEFF,32:POKEFF-40,32:GOTO330
800 FORI=1TO10
805 POKEB,32:POKEB-40,32:POKEB-1,32:POKEB+1,32
810 POKEB,42:POKEB-40,42:POKEB-1,42:POKEB+1,42
820 NEXTI
830 Z=Z+10+W:C=C-40:X=X-40
840 GOTO7
1000 REM***MARTIAN GROUND EXPLOSION***
1010 CC=B  :DD=B
1015 FORF=1TOW
1017 IFPEEK(CC+1)=160ORPEEK(DD-1)=160THEN1100
1018 IFPEEK(CC+1)=233ORPEEK(DD-1)=233THEN1100
1019 IFPEEK(CC+1)=223ORPEEK(DD-1)=223THEN1100
1020 POKECC,42:POKEDD,42
1023 CC=CC+1:DD=DD-1
1025 NEXTF
1030 G=33608
1035 FORD=1TO40:POKEG,32:G=G+1:NEXTD
1045 C=C+40:X=X+40 :GOTO10
1100 FORI=1TO10
1105 POKEA,32:POKEA-40,32:POKEA-1,32:POKEA+1,32
1110 POKEA,42:POKEA-40,42:POKEA-1,42:POKEA+1,42
1120 NEXTI
1130 CR=CR-1:X=X+40:C=C+40:IFCR=0THEN1200
1140 GOTO10
1200 PRINT"▒"
1210 PRINT"YOU GOT BLOWN UP EARTHLING"
1220 PRINT"▒AND SCORED ";Z" POINTS"
1230 PRINT"▒THE EARTH IS NOW OVERRUN WITH MARTIANS"
1240 IFZ>K THEN1250
1241 IFZ>K THEN1250
1245 PRINT:PRINT"HIGH SCORE IS STILL ";K "POINTS"
1246 FORX=1TO2900:NEXTX:GOTO3
1250 PRINT:PRINT"▒THE HIGHEST SCORE TODAY!"
1255 K =Z
1260 FORX=1TO2900:NEXTX:GOTO3
1300 POKEFF,32:GOTO218
1350 POKEFF,32:GOTO330
1500 GOTO1550
1505 FORJJ=1TO1500:NEXTJJ
1510 PRINT"▒"
1520 PRINT"▒ALL EARTHLINGS WILL BE SLAVES TO THE"
1530 PRINT"▒MARTIAN MASTER RACE......!"
1540 PRINT"▒YOU SCORED ";Z" POINTS":GOTO1240
1550 A=C+346 :B=C+160:C=C+374
1560 FORT=1TO2
1570 POKEA,78:POKEC,77
1580 A=A+39:B=B+40:C=C+41
1585 FORF=1TO250:NEXTF
1590 NEXTT
1595 FORH=1TO5
1600 POKEB,67:FORX=1TO150:NEXTX
1601 B=B+40
1602 NEXTH:FORX=1TO750:NEXTX
1603 B=B-160
1604 FORT=1TO4:FORH=1TO250:NEXTH
1605 POKEB-40,67:POKEB,88:B=B+40:NEXTT
1610 PRINT"▒        THE MARTIANS HAVE LANDED"
1620 GOTO1505
1700 PRINT"▒YOU HAVE BEATEN THE MARTIANS.RECEIVE"
1710 PRINT:PRINT"A BONUS OF 250 POINTS AND TRY TO STOP"
1720 PRINT:PRINT"THE NEXT ATTACK FROM REACHING EARTH"
1725 IFW=8THEN2000
1730 Z=Z+250:C=32787+(W*40):A=33627:X=32928+(W*40):W=W+1
1740 FORL=1TO3000:NEXTL:GOTO10
1800 PRINT"[graphic characters]":PRINT"[graphic characters]"
1810 PRINT"[graphic characters]"
1820 PRINT"[graphic characters]"
1830 PRINT"[graphic characters]"
1835 PRINT"[graphic characters]"
1836 PRINT"▒▒     HIGHEST SCORE TODAY IS ";K
1841 PRINT"▒▒     PRESS ANY KEY THEN RETURN▒"
1842 INPUTY$
1845 PRINT"▒"
1850 PRINT"▒STOP THE MARTIAN SPACESHIP FROM "
1860 PRINT:PRINT"REACHING EARTH.KAMIKAZE MARTIANS"
1870 PRINT:PRINT"WILL DROP FROM THE SHIP AND TRY AND "
1880 PRINT:PRINT"HIT YOU.WATCH OUT FOR THEIR EXPLOSION."
1890 PRINT:PRINT"EACH TIME YOU HIT A MARTIAN YOU GET 10"
1900 PRINT:PRINT"POINTS AND THE SPACSHIP MOVES UP.WHEN A"
1910 PRINT:PRINT"MARTIAN LANDS IT MOVES DOWN.TO GET THE"
1920 PRINT:PRINT"250 POINT BONUS MOVE THE SPACESHIP OFF"
1930 PRINT:PRINT"THE TOP OF THE SCREEN.PRESS THE SPACE"
1940 PRINT:PRINT"BAR TO FIRE,Z TO GO LEFT,?TO GO RIGHT."
1945 PRINT:PRINT"THE LEVEL OF DIFFICULTY GIVES A BONUS"
1950 PRINT:PRINT"PRESS ANY KEY THEN RETURN TO START...."
1960 INPUTF$:IFF$=""THEN1960
1970 PRINT"▒":GOTO5
2000 PRINT:PRINT"YOU HAVE REACHED THE TOP BONUS STAGE."
2010 PRINT:PRINT"RECIEVE AN EXTRA 1000 POINTS AND START"
2020 PRINT:PRINT"AGAIN AT LEVEL ONE.":W=0:Z=Z+1000:GOTO1730
```

Illustration: Dorian Cross



GALAXIAN COLONY II

Message to Earth Defence Command. Priority One. A new breed of Galaxians are invading earthspace. It appears they are attempting to colonise this planet. They must be stopped at all costs. Alert defence forces immediately.

The only way pilots can destroy these aliens is to collide with them. But our intelligence service reports that these aliens transform at random into construction units on entering earth's atmosphere — collision with an alien after it has transformed will prove fatal.

These aliens must not be allowed to penetrate earth defences. The outcome of a landing by even one of the attacking force could be disasterous for mankind. I repeat — they must be stopped at all costs . . .

```
5  GOSUB 10000
10 R = 16: ROT= R:AL = 6: HOME :D = 5:ST = 1500: GOSUB 8000
15  HCOLOR= SH
20  FOR Y = 0 TO 159 STEP 3
30  HPLOT  INT ( RND (1) * 280),Y
40  NEXT Y
100  DIM A(350): DEF  FN X(X) =  INT ((((Y - 5) / 11) * 24) + ((X - 5) / 11)): DEF  FN A(A) =  INT ((((B - 5) / 11) * 24) + ((A - 5) / 11))
101  DEF  FN M(N) =  INT ((((M - 5) / 11) * 24) + ((N - 5) / 11))
```

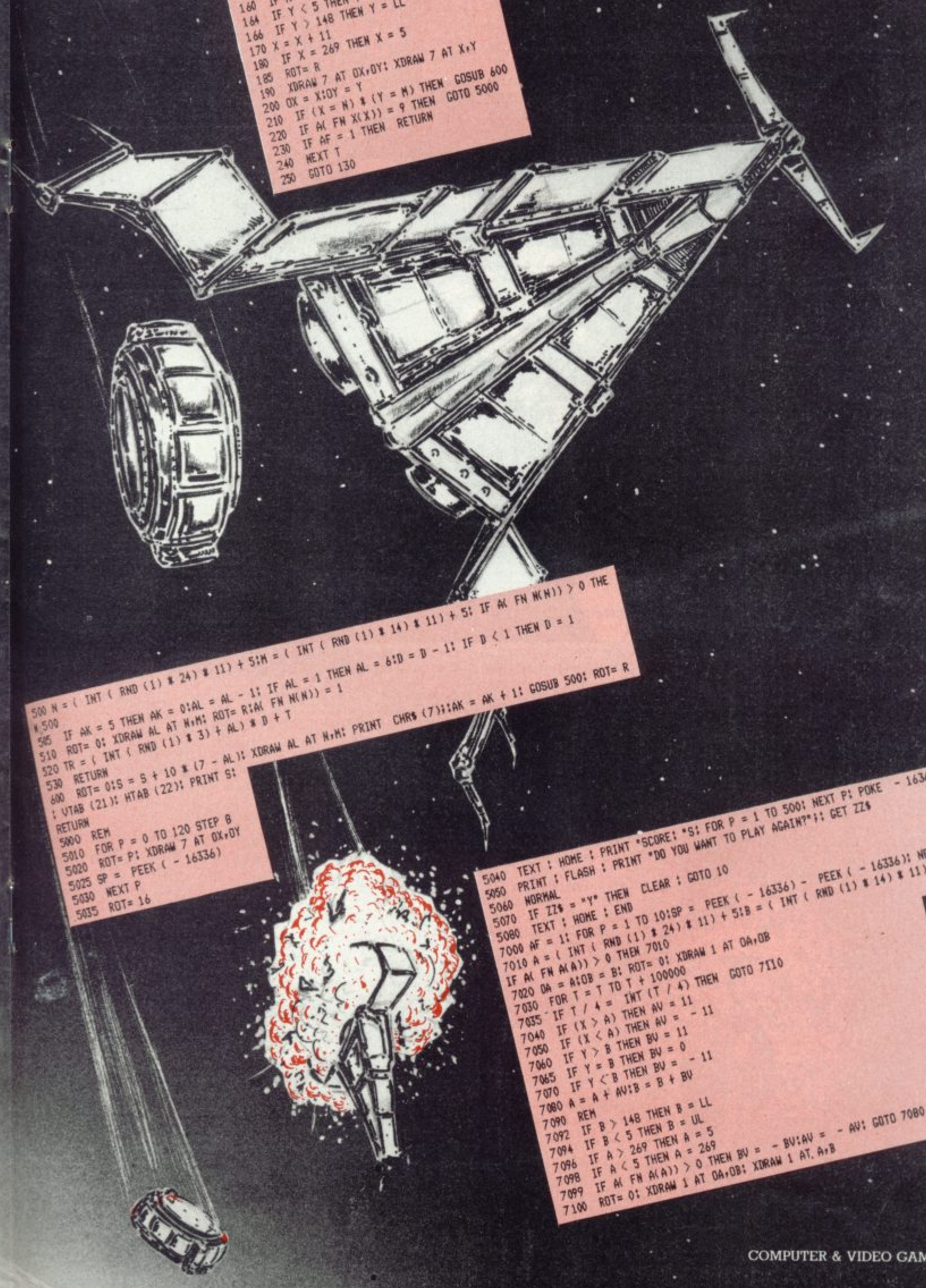
```
105  GOSUB 500: FOR P = 1 TO 350:A(P) = 0: NEXT P
110 X = 5:Y = ( INT ( RND (1) * 14) * 11) + 5
120  XDRAW 7 AT X,Y:OX = X:OY = Y
125  HOME : FLASH : VTAB (21): PRINT "      HIT ANY KEY TO START      "; NORMAL : POKE  - 16368,0: WAIT  - 16384,128
126  HOME : VTAB (21): PRINT "      SCORE="S
130  FOR T = 1 TO 100000
135  IF (T > TR) AND ((N < X) OR (N > X + 50)) THEN  ROT= 0: XDRAW AL AT N,M: XDRAW 9 AT N,M:A( FN
```

RUNS ON AN APPLE II IN 48K

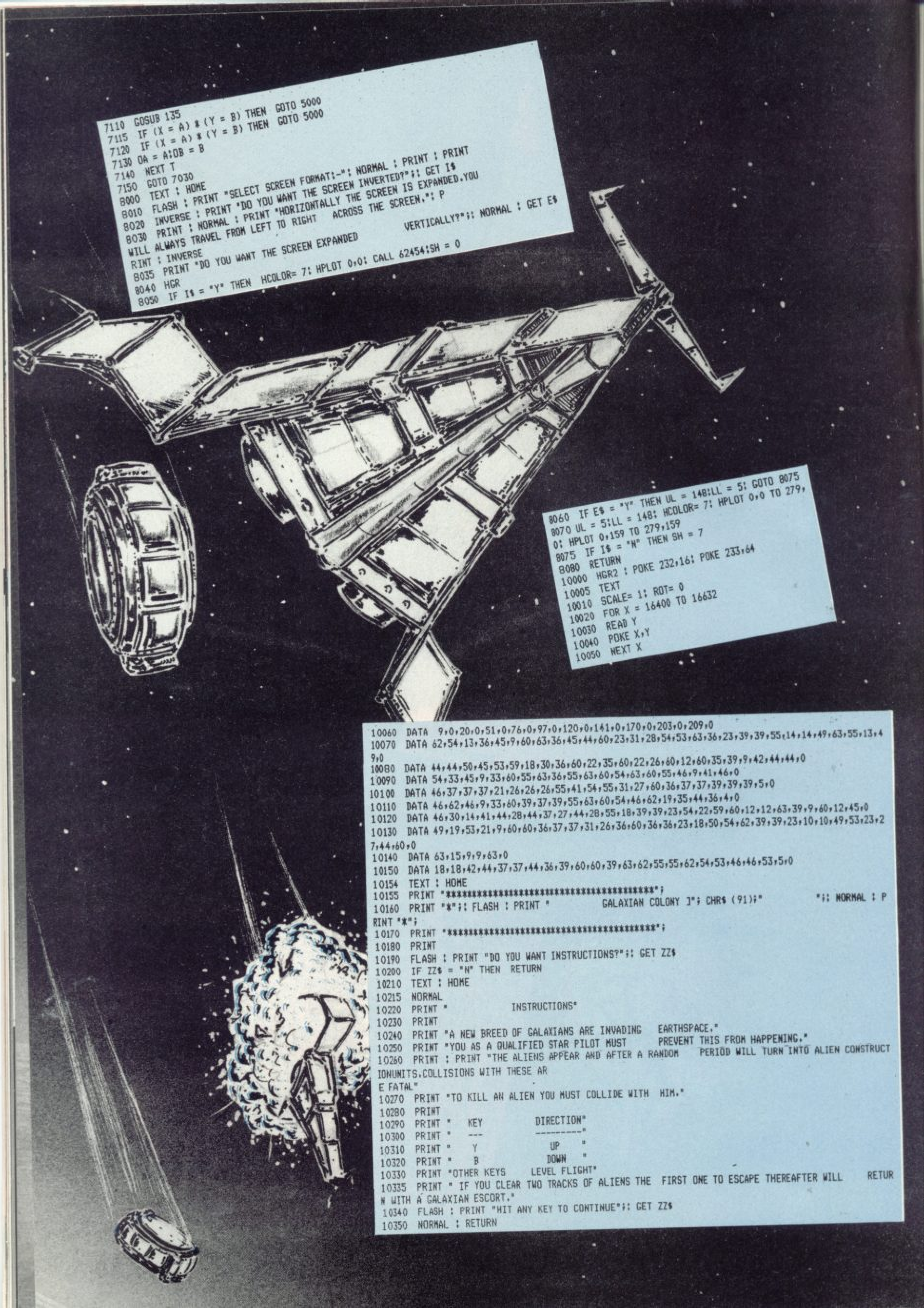
BY NEIL FORSYTH

Illustration: Dorian Cross

```
N(N)) = 9: GOSUB 500:: IF (S > ST
)* (AF < > 1) THEN  GOTO 7000
140 K =  PEEK ( - 16384)
150  IF K = 217 THEN Y = Y - 11
160  IF K = 194 THEN Y = Y + 11
164  IF Y < 5 THEN Y = UL
166  IF Y > 148 THEN Y = LL
170 X = X + 11
180  IF X = 269 THEN X = 5
185  ROT= R
190  XDRAW 7 AT OX,OY: XDRAW 7 AT X,Y
200 OX = X:OY = Y
210  IF (X = N) * (Y = M) THEN  GOSUB 600
220  IF A( FN X(X)) = 9 THEN  GOTO 5000
230  IF AF = 1 THEN  RETURN
240  NEXT T
250  GOTO 130
```



```
500 N = ( INT ( RND (1) * 24) * 11) + 5:M = ( INT ( RND (1) * 14) * 11) + 5: IF A( FN N(N)) > 0 THE
N 500
505  IF AK = 5 THEN AK = 0:AL = AL - 1: IF AL = 1 THEN AL = 6:D = D - 1: IF D < 1 THEN D = 1
510  ROT= 0: XDRAW AL AT N,M: ROT= R:A( FN N(N)) = 1
520 TR = ( INT ( RND (1) * 3) + AL) * D + T
530  RETURN
600  ROT= 0:S = S + 10 * (7 - AL): XDRAW AL AT N,M: PRINT  CHR$ (7);:AK = AK + 1: GOSUB 500: ROT= R
: VTAB (21): HTAB (22): PRINT S;
RETURN
5000  REM
5010  FOR P = 0 TO 120 STEP 8
5020  ROT= P: XDRAW 7 AT OX,OY
5025 SP =  PEEK ( - 16336)
5030  NEXT P
5035  ROT= 16
5040  TEXT : HOME : PRINT "SCORE: "S: FOR P = 1 TO 500: NEXT P: POKE  - 16368,0
5050  PRINT : FLASH : PRINT "DO YOU WANT TO PLAY AGAIN?";: GET ZZ$
5060  NORMAL
5070  IF ZZ$ = "Y" THEN  CLEAR : GOTO 10
5080  TEXT : HOME : END
7000 AF = 1: FOR P = 1 TO 10:SP =  PEEK ( - 16336) -  PEEK ( - 16336): NEXT P
7010 A = ( INT ( RND (1) * 24) * 11) + 5:B = ( INT ( RND (1) * 14) * 11) + 5:
IF A( FN A(A)) > 0 THEN 7010
7020 OA = A:OB = B: ROT= 0: XDRAW 1 AT OA,OB
7030  FOR T = T TO T + 100000
7035  IF T / 4 =  INT (T / 4) THEN  GOTO 7110
7040  IF (X > A) THEN AV = 11
7050  IF (X < A) THEN AV =  - 11
7060  IF Y > B THEN BV = 11
7065  IF Y = B THEN BV = 0
7070  IF Y < B THEN BV =  - 11
7080 A = A + AV:B = B + BV
7090  REM
7092  IF B > 148 THEN B = LL
7094  IF B < 5 THEN B = UL
7096  IF A > 269 THEN A = 5
7098  IF A < 5 THEN A = 269
7099  IF A( FN A(A)) > 0 THEN BV =  - BV:AV =  - AV: GOTO 7080
7100  ROT= 0: XDRAW 1 AT OA,OB: XDRAW 1 AT. A,B
```



```
7110  GOSUB 135
7115  IF (X = A) * (Y = B) THEN  GOTO 5000
7120  IF (X = A) * (Y = B) THEN  GOTO 5000
7130 OA = A:OB = B
7140  NEXT T
7150  GOTO 7030
8000  TEXT : HOME
8010  FLASH : PRINT "SELECT SCREEN FORMAT:-": NORMAL : PRINT : PRINT
8020  INVERSE : PRINT "DO YOU WANT THE SCREEN INVERTED?";: GET I$
8030  PRINT : NORMAL : PRINT "HORIZONTALLY THE SCREEN IS EXPANDED.YOU
WILL ALWAYS TRAVEL FROM LEFT TO RIGHT   ACROSS THE SCREEN.": P
RINT : INVERSE
8035  PRINT "DO YOU WANT THE SCREEN EXPANDED           VERTICALLY?";: NORMAL : GET E$
8040  HGR
8050  IF I$ = "Y" THEN  HCOLOR= 7: HPLOT 0,0: CALL 62454:SH = 0
```

```
8060  IF E$ = "Y" THEN UL = 148:LL = 5: GOTO 8075
8070 UL = 5:LL = 148: HCOLOR= 7: HPLOT 0,0 TO 279,
0: HPLOT 0,159 TO 279,159
8075  IF I$ = "N" THEN SH = 7
8080  RETURN
10000  HGR2 : POKE 232,16: POKE 233,64
10005  TEXT
10010  SCALE= 1: ROT= 0
10020  FOR X = 16400 TO 16632
10030  READ Y
10040  POKE X,Y
10050  NEXT X
```

```
10060  DATA  9,0,20,0,51,0,76,0,97,0,120,0,141,0,170,0,203,0,209,0
10070  DATA 62,54,13,36,45,9,60,63,36,45,44,60,23,31,28,54,53,63,36,23,39,39,55,14,14,49,63,55,13,4
9,0
10080  DATA 44,44,50,45,53,59,18,30,36,60,22,35,60,22,26,60,12,60,35,39,9,42,44,44,0
10090  DATA 54,33,45,9,33,60,55,63,36,55,63,60,54,63,60,55,46,9,41,46,0
10100  DATA 46,37,37,37,21,26,26,26,55,41,54,55,31,27,60,36,37,37,39,39,39,5,0
10110  DATA 46,62,46,9,33,60,39,37,39,55,63,60,54,46,62,19,35,44,36,4,0
10120  DATA 46,30,14,41,44,28,44,37,27,44,28,55,18,39,39,23,54,22,59,60,12,12,63,39,9,60,12,45,0
10130  DATA 49,19,53,21,9,60,60,36,37,37,31,26,36,60,36,36,23,18,50,54,62,39,39,23,10,10,49,53,23,2
7,44,60,0
10140  DATA 63,15,9,9,63,0
10150  DATA 18,18,42,44,37,37,44,36,39,60,60,39,63,62,55,55,62,54,53,46,46,53,5,0
10154  TEXT : HOME
10155  PRINT "****************************************";
10160  PRINT "*";: FLASH : PRINT "          GALAXIAN COLONY ]"; CHR$ (91);"          ";: NORMAL : P
RINT "*";
10170  PRINT "****************************************";
10180  PRINT
10190  FLASH : PRINT "DO YOU WANT INSTRUCTIONS?";: GET ZZ$
10200  IF ZZ$ = "N" THEN  RETURN
10210  TEXT : HOME
10215  NORMAL
10220  PRINT "            INSTRUCTIONS"
10230  PRINT
10240  PRINT "A NEW BREED OF GALAXIANS ARE INVADING   EARTHSPACE."
10250  PRINT "YOU AS A QUALIFIED STAR PILOT MUST      PREVENT THIS FROM HAPPENING."
10260  PRINT : PRINT "THE ALIENS APPEAR AND AFTER A RANDOM   PERIOD WILL TURN INTO ALIEN CONSTRUCT
IONUNITS.COLLISIONS WITH THESE AR
E FATAL"
10270  PRINT "TO KILL AN ALIEN YOU MUST COLLIDE WITH  HIM."
10280  PRINT
10290  PRINT "   KEY          DIRECTION"
10300  PRINT "   ---          ---------"
10310  PRINT "    Y              UP    "
10320  PRINT "    B             DOWN   "
10330  PRINT "OTHER KEYS     LEVEL FLIGHT"
10335  PRINT " IF YOU CLEAR TWO TRACKS OF ALIENS THE  FIRST ONE TO ESCAPE THEREAFTER WILL     RETUR
N WITH A GALAXIAN ESCORT."
10340  FLASH : PRINT "HIT ANY KEY TO CONTINUE";: GET ZZ$
10350  NORMAL : RETURN
```

BRICKBLASTER

"When I was very young I used to take great delight in bashing bricks all over the place — but after hitting myself on the head with the wrong end of a claw hammer I decided to stop. But now I can pursue old habits without putting myself in any danger thanks to my VIC-20!" So says Shaun Southern, author of this fast moving program.

At the bottom of the screen produced by your VIC you will see a demon bricklayer, cementing bricks as fast as he can. In fact he gets faster all the time. The rows of bricks will rapidly fill the screen unless you can halt his progress.

You are in control of a small craft at the top of the screen which whizzes back and forth almost as fast as the bricklayer. You have to drop bombs on the wall to knock holes in it — it's as simple as that! The bombs are fired by using the f7 key — the only control in the game.

Shaun has provided some tips on getting a high score. His is 218. He advises you to aim for the cracks in the wall as this scores more points. The ends of the wall should be cleared first — as this is a difficult thing to do later in the game.

The game ends when your craft collides with a brick and your score and the highest score will be displayed.

So if you don't feel like becoming another brick in the wall — get blasting!

```
10 REM *** INITIALISATION ***
11 POKE36878,15:S1=36876:S2=36877:DIMXX$(1)
12 XX$(0)="██┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬":XX$(1)="███┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬┬██"
13 REM *** RESET VARIABLES ***
14 GOSUB46:POKE36879,93:P1=7680:P2=1:SC=0:X2=-1:X3=0:ZZ=0
15 PRINTCHR$(142)"██████████████";:FORX4=1TO5:PRINTXX$(0):PRINTXX$(1):NEXT
16 REM *** CONTROL ROUTINNE ***
17 GOSUB30:IFZZ=1THEN37
18 POKES1,200:GOSUB33:FORDE=1TO20:NEXTDE:POKES1,0:GETIN$:IFIN$<>CHR$(136)THEN17
19 REM *** FIRE MISSILE ***
20 FORH1=P1+22TO8185STEP22:IFPEEK(H1)<>32THEN24
21 POKEH1+30720,0:POKEH1,93:POKES1,200+2*(INT(H1-7680)/22):GOSUB30:IFZZ=1THEN37
22 GOSUB33:POKES1,0:POKEH1,32:NEXTH1:GOTO17
23 REM *** REMOVE BRICKS ***
24 H2=(PEEK(H1)=227)-(PEEK(H1)=207):POKEH1,32:POKEH1+H2,32:POKES1,250:SC=SC+1
25 H1=H1-22:FORH3=1TO21:H4=H1+H2*H3:IFPEEK(H4)=32ORH4<7700THENH3=21:GOTO27
26 POKEH4,32:POKEH4+H2,32:POKES1,250-3*H3:SC=SC+1
27 H1=H1-22:GOSUB30:IFZZ=1THEN37
28 GOSUB33:POKES1,0:NEXTH3:POKE198,0:GOTO17
29 REM *** MOVE PLAYER ***
30 P2=P2+(2*P2*(P1+P2<7680ORP1+P2>7700)):IFPEEK(P1+P2)<>32THENZZ=1:RETURN
31 POKEP1,32:P1=P1+P2:POKEP1+30720,0:POKEP1,35:RETURN
```

```
32 REM *** LAY BRICK ***
33 X1=X1+.5+SC/250:IFX1<2THENRETURN
34 POKES2,200:X1=X1-2:X2=X2+2:IFX2>LEN(XX$(X3))THENX2=1:PRINT:H1=H1-22:X3=1-X3
35 PRINTMID$(XX$(X3),X2,2);:POKES2,0:POKEP1+30720,0:POKEP1,35:RETURN
36 REM *** GAME OVER ***
37 PRINT"■■■■■■■   ■■YOUR SCORE ="SC:HS=HS+(SC>HS)*(HS-SC):PRINT"■■■  ■HIGH SCOR
E ="HS
38 POKES1,0:POKES2,140:FORDE=1TO2000:NEXT:POKES2,0:FORDE=1TO1000:NEXT:RESTORE
39 FORM1=1TO11:READM2,M3:POKES1,M2:FORDE=1TO150*M3-30:NEXT:POKES1,0:FORDE=1TO25
:NEXTDE
40 NEXTM1:DATA183,6,183,4,183,2,183,6,195,4,191,2,191,3,183,3,183,3,179,3,183,6
41 PRINT"■■■ ANOTHER GAME (Y/N) ?"
42 GETIN$:IFIN$<>"Y"ANDIN$<>"N"THEN42
43 IFIN$="Y"THEN14
44 POKE36878,0:PRINT"■■";:POKE36879,27:END
45 REM *** INSTRUCTIONS ***
46 POKE36879,234:PRINT"■"CHR$(14)"■■.....|⌐¬⌐|L♠♥|‾¬....■";
47 PRINT"■■ ■  DU ARE AT THE TOP    OF THE SCREEN AND AT  THE BOTTOM IS A DEMON"
;
48 PRINT" BRICKLAYER.                ■ ¬RESS F7 TO DROP A    BOMB AND DEMOLISH     ";
49 PRINT" PART OF THE WALL.      ■   |HE GAME IS OVER      WHEN YOU COLLIDE       ";
50 PRINT" WITH A BRICK, AND       YOUR SCORE AND THE     HIGH SCORE ARE SHOWN.";
51 PRINT"■  |HE GAME GETS HARDER AS YOU PROGRESS.           ";
52 PRINT"■■■¬RESS ANY KEY TO START";:POKE198,0:WAIT198,1:POKE198,0:RETURN
READY.
```

RUNS ON A VIC-20 IN 3.5K

BY SHAUN SOUTHERN



HUNGARIAN SQUARES



Illustration: Dorian Cross

More puzzling than that Cube, more colourful than a trip into hyperspace — that's the Hungarian Squares!

On your screen appear two multicoloured squares. Look carefully and you'll see that each of the two large squares is made up of several smaller coloured squares. The idea of the game is to manipulate the smaller squares to create two big squares of alternating colours. Or you can simply create your own patterns — which might just be easier!

The program is fairly simple, making use of CALL GCHAR and CALL HCHAR, which are the TI equivalent of PEEKING and POKING the screen display, respectively. The screen is 32 columns wide and 24 lines deep. CALL GCHAR and CALL HCHAR use the format:

(ROW, COLUMN, NUMERIC VARIABLE)

where the numeric variable is the ASCI code of the character.

CALL KEY is the equivalent of INKEY or GET— CALL KEY(O,A,B) will return the ASCI value of the key pressed to variable A. B is 0 if no key is pressed.

CALL CHAR defines the characters and CALL COLOR their colours. Numeric arrays are used to hold the screen position of each of the small squares — numbered from 1 to 20 from the top left corner of each large square and counting clockwise.

This program occupies under 4k of memory, but requires 4.8k to operate in. Those arrays take up a little room.

RUNS ON A TEXAS INSTRUMENTS T1/99 4A IN 4·8K

BY STEPHEN SHAW

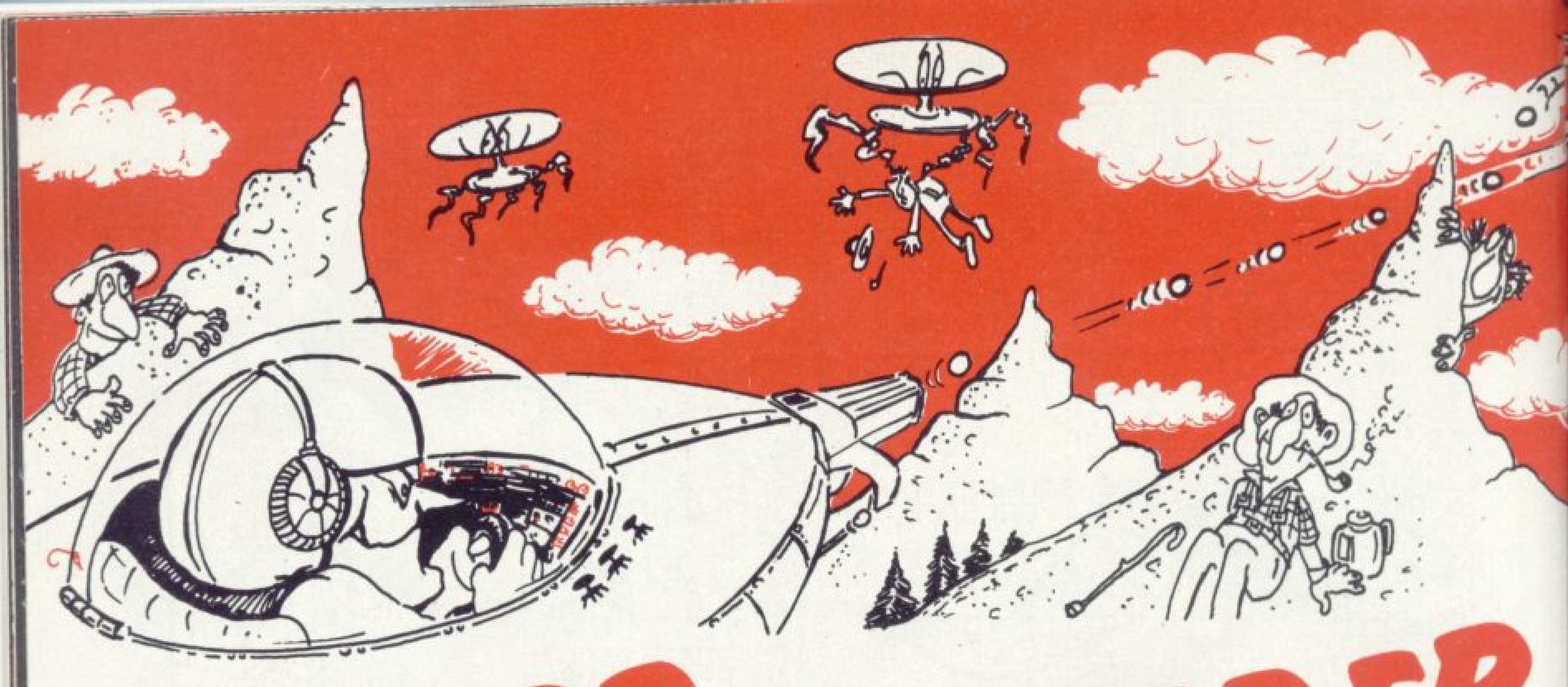
```
100 DIM RA(20),CA(20),RB(20),CB(
20)
120 CALL CHAR(128,"FF80BE8888B88
0FF")
140 CALL CHAR(129,"017D417D057D0
1FF")
1·60 CALL CLEAR
180 CALL HCHAR(23,26,128)
200 CALL HCHAR(24,26,129)
220 FOR C=96 TO 120 STEP 4
240 CALL CHAR(C,"FF818181818181F
F")
260 NEXT C
280 PRINT "HUNGARIAN SQUARES"
300 CALL COLOR(10,2,16)
320 CALL COLOR(11,2,12)
```

```
340 CALL COLOR(12,2,6)
360 CALL COLOR(13,2,13)
380 CALL COLOR(14,5,14)
400 PRINT " ":"(C) STEPHEN SHAW
1982"::::"A MANIPULATIVE PUZZLE"
420 PRINT " ":::"PRESS ANY KEY T
O CONTINUE"
440 FOR C=1 TO 6
460 RA(C)=1
480 RB(C)=5
500 CA(C)=C*2+1
520 CB(C)=C*2+7
540 NEXT C
560 CALL KEY(0,A,B)
580 IF B=0 THEN 560
600 CALL CLEAR
620 PRINT "TWO LARGE SQUARES,A &
 B ARE FORMED OF SMALL COLORED
    SQUARES"
630 PRINT "THERE ARE TEN SMALL S
QUARES OF TWO COLORS AND NINE OF
    TWO OTHER COLORS"
640 PRINT "THE OBJECT IS TO FORM
 ONE OFTHE LARGE SQUARES OF":"AL
TERNATELY COLORED SMALL"
650 PRINT "SQUARES-USING THE COL
ORS OF WHICH THERE ARE TEN SMALL
    SQUARES"
660 PRINT "AND ALSO FORMING THE
OTHER  LARGE SQUARE OF ALTERNATE
    SMALL SQUARES"
670 PRINT " ":"OR YOU CAN TRY TO
 FORM YOUR OWN PATTERNS!"
700 PRINT " ":"PRESS ANY KEY TO
CONTINUE"
720 CALL KEY(0,A,B)
740 IF B=0 THEN 720
760 CALL CLEAR
780 FOR C=1 TO 4
800 RA(6+C)=C*2+1
820 RB(6+C)=C*2+5
840 CA(6+C)=13
860 CB(6+C)=19
880 RA(C+16)=11-C*2
900 RB(C+16)=15-C*2
920 CA(C+16)=3
940 CB(C+16)=9
960 NEXT C
980 CALL HCHAR(4,29,128)
1000 CALL HCHAR(5,29,129)
1020 FOR C=1 TO 6
1040 RA(C+10)=11
1060 RB(C+10)=15
1080 CA(C+10)=15-2*C
1100 CB(C+10)=21-2*C
1120 NEXT C
1140 PRINT "PRESS A OR B...<"
1160 PRINT "PRESS 1 TO MOVE CLOC
KWISE":"& 2 TO MOVE ANTICLOCKWIS
E"
1180 FOR C=1 TO 7
1200 CALL HCHAR(RA(C),CA(C),96)
1220 CALL HCHAR(RB(C),CB(C),104)
1240 NEXT C
1260 CALL HCHAR(RB(8),CB(8),112)
1280 FOR C=9 TO 17
1300 CALL HCHAR(RA(C),CA(C),120)
1320 CALL HCHAR(RB(C),CB(C),112)
1340 NEXT C
1360 FOR C=19 TO 20
1380 CALL HCHAR(RA(C),CA(C),96)
1400 CALL HCHAR(RB(C),CB(C),104)
1420 NEXT C
1440 CALL HCHAR(RA(18),CA(18),96
)
1460 CALL HCHAR(3,5,ASC("A"))
1480 CALL HCHAR(13,17,ASC("B"))
1500 REM  ACTUAL MOVEMENT
  HERE   ***********
1520 CALL HCHAR(21,18,30)
1540 CALL HCHAR(21,18,32)
1560 CALL KEY(0,A,B)
1580 IF B=0 THEN 1520
1600 IF A=ASC("A")THEN 1660
1620 IF A=ASC("B")THEN 2220
1640 GOTO 1500
1660 CALL HCHAR(22,31,30)
1680 CALL HCHAR(22,31,32)
1700 CALL HCHAR(23,31,30)
1720 CALL HCHAR(23,31,32)
1740 CALL KEY(0,A,B)
1760 IF B=0 THEN 1660
1780 REM  MOVE SQUARE A
1800 IF A=ASC("1")THEN 1860
1820 IF A=ASC("2")THEN 2040
1840 GOTO 1660
1860 REM  MOVE A CLOCKWISE
1880 CALL GCHAR(RA(1),CA(1),TEMP
A)
1900 FOR C=1 TO 19
1920 CALL GCHAR(RA(C+1),CA(C+1),
TEMPB)
1940 CALL HCHAR(RA(C+1),CA(C+1),
TEMPA)
1960 TEMPA=TEMPB
1980 NEXT C
2000 CALL HCHAR(RA(1),CA(1),TEMP
A)
2020 GOTO 1500
2040 REM  MOVE A ANTICLOCKWISE

2060 CALL GCHAR(RA(20),CA(20),TE
MPA)
2080 FOR C=19 TO 1 STEP -1
2100 CALL GCHAR(RA(C),CA(C),TEMP
B)
2120 CALL HCHAR(RA(C),CA(C),TEMP
A)
2140 TEMPA=TEMPB
2160 NEXT C
2180 CALL HCHAR(RA(20),CA(20),TE
MPA)
2200 GOTO 1500
2220 CALL HCHAR(22,31,30)
2240 CALL HCHAR(22,31,32)
2260 CALL HCHAR(23,31,30)
2280 CALL HCHAR(23,31,32)
2300 CALL KEY(0,A,B)
2320 IF B=0 THEN 2220
2340 IF A=ASC("1")THEN 2400
2360 IF A=ASC("2")THEN 2580
2380 GOTO 2220
2400 REM  MOVE B CLOCKWISE
2420 CALL GCHAR(RB(1),CB(1),TEMP
A)
2440 FOR C=1 TO 19
2460 CALL GCHAR(RB(C+1),CB(C+1),
TEMPB)
2480 CALL HCHAR(RB(C+1),CB(C+1),
TEMPA)
2500 TEMPA=TEMPB
2520 NEXT C
2540 CALL HCHAR(RB(1),CB(1),TEMP
A)
2560 GOTO 1500
2580 REM  MOVE B ANTI-
CLOCKWISE
2600 CALL GCHAR(RB(20),CB(20),TE
MPA)
2620 FOR C=19 TO 1 STEP -1
2640 CALL GCHAR(RB(C),CB(C),TEMP
B)
2660 CALL HCHAR(RB(C),CB(C),TEMP
A)
2680 TEMPA=TEMPB
2700 NEXT C
2720 CALL HCHAR(RB(20),CB(20),TE
MPA)
2740 GOTO 1500
2760 END
2780 REM  (C)1982
2800 REM  BY STEPHEN SHAW
2820 REM  10 ALSTONE ROAD
2840 REM  STOCKPORT  CHESHIRE

2860 REM  SK4 5AH
2880 REM
2900 REM  *****************

2920 END
```



SHARP DEFENDER

RUNS ON A SHARP MZ-80K IN 14K — **BY BASIL ZIMMO**

Can you defend the inhabitants of an alpine planet from destruction at the hands of alien kidnappers?

In Sharp Defender you are at the controls of a spacecraft flying across mountainous terrain with a mission of protection ahead of you.

The aliens enter from the right, firing and dropping bombs to try and pick off their prey from one of the mountain peaks.

You can judge their approach on the radar screen and try to dodge their fire and pick the kidnappers off before they can get alien claws into human flesh.

Your task is made more difficult by the antics of the planet's inhabitants, who seem to come from mountaineering stock and climb the peaks regardless of the peril they put themselves in.

If an alien lander reaches his prey or manages to hit your ship, then you lose a life. After three lives the game is over.

Basil Zimmo has produced a very neat graphical representation of the popular arcade game and although it is written in Basic it still proves difficult to excel at.

There are several good presentation touches and the game comes complete with a range of sound effects.

The control keys are: W= up; X= down; A= left; D= right; S= fire; H= hyperspace.

```
1 REM ▒▒▒  SHARP DEFENDER
2 REM ▀◢   Written for C&V games
4 REM ◢▄   MAY 1982
5 REM ▒▒▒  BY BASIL ZIMMO
6 REM
15 REM * INSTRUCTIONS *
16 REM "◘"=CLEAR SCREEN, "◘"=CURSOR HOME, "◘"=CURSOR DOWN, "◘"=CURSOR UP
20 PRINT"◘";TAB(13);"D E F E N D E R"
25 PRINTTAB(13);"                "
30 PRINT"◘ YOU ARE IN COMMAND OF A DEFENDER SHIP."
35 PRINT"YOUR MISSION IS TO DEFEND THE MEN ON THE";
40 PRINT"MOUNTAINS. IF A MAN IS KILLED OR YOUR   SHIP IS HIT THEN YOU LOSE";
45 PRINT" ONE SHIP. GAMEIS OVER WHEN ALL 3 SHIPS ARE LOST."
50 PRINT"◘◘ CONTROLS ARE:"
55 PRINT" W = UP
56 PRINT" X = DOWN
57 PRINT" A = LEFT
58 PRINT" D = RIGHT
59 PRINT" S = FIRE
60 PRINT" H = HYPERSPACE
90 REM ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890!"#$%&'()π+-*=£;.,/:?\[]>@<♠♦♥♣()π+
95 REM CHR$(99)="‡"
100 K$=CHR$(99):M$="     ^         ^                 "
110 M$=M$+" "+K$+"/  \  ^"+K$+"     /  \"+K$+"  "+K$+"    ^      "+K$+"^   "
```



```
120 M$=M$+" ┌      ╲╱  ┐ "+K$+"╱╲╱     ┐ ┌╲"+K$+" ╱  ╲╱╲  ┌  ╲"+K$
130 M$=M$+"╱            ╲┌          ╲╱  ┐╱        ╲╱      ┐"
140 DIMM$(40):A$="▣PLEASE WAIT WHILE A NEW GAME IS PREPARED"
145 REM * PREPARE MOUNTAINS *
150 FORX=1TO40
155 PRINTMID$(A$,X,1);
160 FORI=0TO160STEP40
170 D$=D$+MID$(M$,I+2,39)+MID$(M$,I+1,1)
180 NEXTI:M$(X)=D$:M$=D$:D$="":NEXTX
181 PRINT"▣              PRESS    ANY    KEY                 "
182 GETA$:IFA$=""THEN182
185 N=3:S=0
190 SY=4466:SX=4465:SC=53248:Z=0:AL=206:MA=202:SP=64:TEMPO7
200 DX=11:DY=INT(RND(1)*9)+9
210 DIMA(4,2),S(4),T(4),E(15,15):PRINT"▣":D$=""
215 REM * RANDOM POSITION FOR ALIENS *
220 FORI=1TO4
230 A(I,1)=INT(RND(1)*15)+62:A(I,2)=INT(RND(1)*11)+2:NEXT
240 H=0:MT=1:GOSUB5000:XD=DX:YD=DY
1000 GOSUB5100:D$="◢▬▬":GOSUB2000:GOSUB1920
1010 GOSUB2100:IFH=1THEN4000
1015 GOSUB1500:IFH=1THEN4000
1020 GOSUB5070
1030 GOSUB5100:R=1:GOSUB1500:R=0:IFH=1THEN4000
1040 GOTO1010
1499 REM * MOVE DEFENDER *
1500 POKE17828,0:GETK$:IFK$=""THENRETURN
1510 IF(R=1)*(K$="S")THENRETURN
1520 K=1*(K$="W")+1*(K$="X")+1*(K$="A")+1*(K$="D")+1*(K$="H")+1*(K$="S")
1530 IFK=0THENRETURN
1540 K=0:XD=DX:YD=DY:IFK$="H"THEN1860
1550 IFK$="W"THEN1600
1560 IFK$="X"THEN1650
1570 IFK$="A"THEN1700
1580 IFK$="D"THEN1750
1590 IFK$="S"THEN1800
1600 DY=DY-1:IFDY<8THENDY=8:GOTO1910
1610 P=SC+DX+DY*40:FORI=PTOP+3:IF(PEEK(I)=206)+(PEEK(I)=46)THENH=1
1620 NEXTI:GOTO1900
1650 DY=DY+1:IFDY>21THENDY=21:GOTO1930
1660 GOTO1610
1700 DX=DX-1:IFDX<11THENDX=11:GOTO1910
1710 IF(PEEK(SC+DX+DY*40)=46)+(PEEK(SC+DX+DY*40)=206)THENH=1
1720 GOTO1900
1750 DX=DX+1:IFDX>35THENDX=DX-1:GOTO1910
1760 IF(PEEK(SC+DX+4+DY*40)=46)+(PEEK(SC+DX+4+DY*40)=206)THENH=1
1770 GOTO1900
1800 MUSIC"_A0"
1810 A=0:P=SC+DX+4+DY*40:FORI=PTOP+34-DX:J=I:IFPEEK(I)=ALTHENA=1:I=P+39-DX
1815 IFPEEK(I)=46THENI=P+39-DX:REM DISPLAY CODE 46 = "."
1820 POKEJ,124:NEXTI
```

Illustration: Dorian Cross

PLAY FOR TODAY

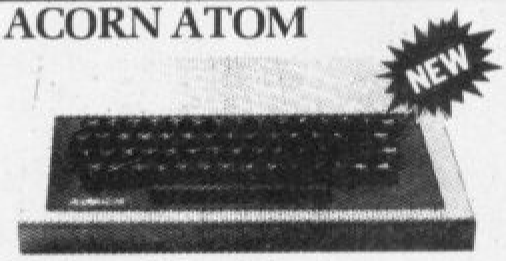
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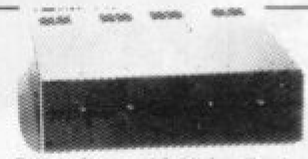
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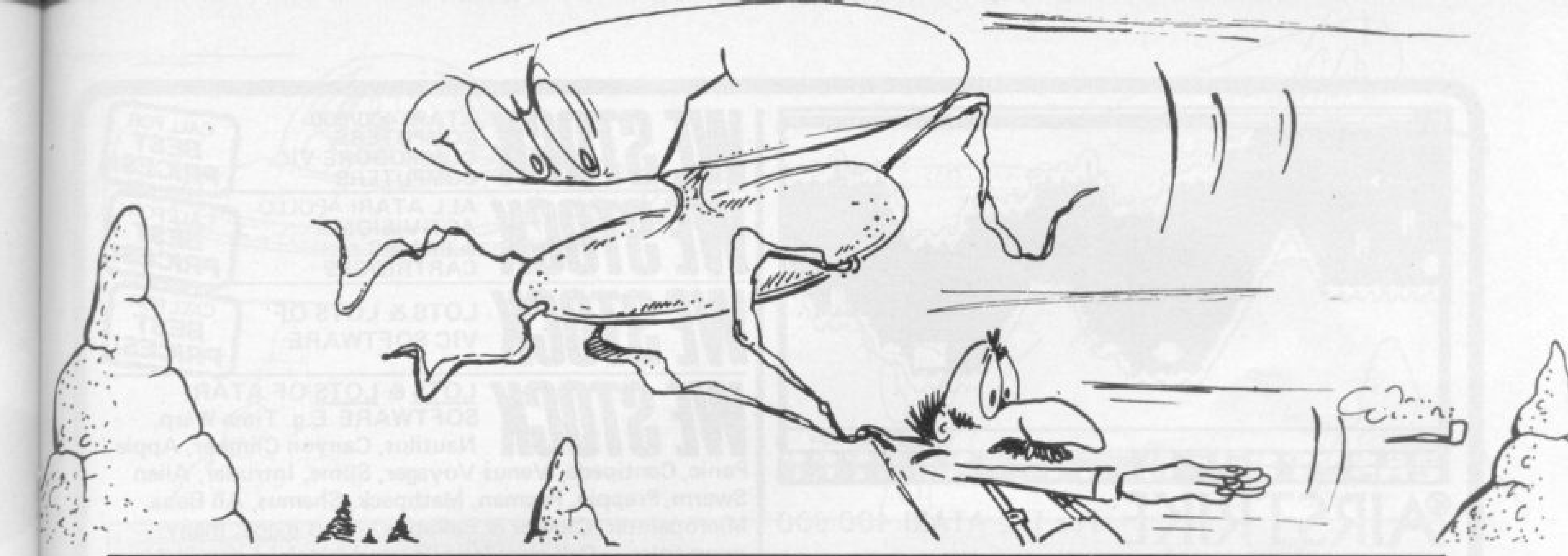
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```
1830 FORI=PTOJ:POKEI,0:NEXT:IFA=1THEN1850
1840 RETURN
1850 POKEJ,107:MUSIC"_C1B0":S=S+1:POKEJ,0:RETURN:REM DISPLAY CODE 107 = "*"
1860 POKESX,DX:POKESY,DY:PRINT"        ":DX=INT(RND(1)*13)+15:DY=INT(RND(1)*9)+12
1870 GOSUB2000
1880 GOTO1910
1900 POKESX,XD:POKESY,YD:PRINT"      "
1901 IFYD>19THEN1916
1905 IF(K$="A")+(K$="D")THEN1915
1910 FORI=0TO3:RESETXD+15+I,YD-6+1:RESETDX+15+I,YD-6-1:RESETXD+15+I,YD-6:NEXT
1915 IFYD=8THENPRINT"▯";TAB(13);"▄▬▬▬▬▬▄"
1916 IFYD>18THENPOKESY,7:POKESX,13:PRINT"▬▬▬▬▬▬▬":IFYD>19THEN1930
1920 RESETXD+15,YD-6:RESETXD+18,YD-6
1925 FORI=0TO3:SETDX+15+I,DY-6:NEXT
1930 POKESX,DX:POKESY,DY:PRINTD$
1940 RETURN
1999 REM * DISPLAY DEFENDER *
2000 FORI=-10TO-1:POKESX,DX+I:POKESY,DY:PRINT" ◢"
2010 POKESY,DY:POKESX,DX+13-(11+I):PRINT"_ ":MUSIC"_C3":NEXTI
2020 FORI=-5TO0:IFDY+I<9THEN 2040
2030 POKESX,DX+1:POKESY,DY+I-1:PRINT" ":POKESX,DX+1:POKESY,DY+I:PRINT"▄"
2040 IFDY-I>17THEN2070
2050 POKESX,DX+2:POKESY,DY-I+1:PRINT" ":POKESX,DX+2:POKESY,DY-I
2060 PRINT"_":MUSIC"_B2"
2070 NEXTI
2080 RETURN
2090 REM * MOVE ALIENS *
2100 FORI=1TO4:RESETA(I,1),A(I,2)
2110 A(I,1)=A(I,1)-1:IF(A(I,1)>26)*(A(I,1)<55)THEN2200
2115 IFA(I,1)<3THENA(I,1)=75
2120 IF A(I,1)=26THENPOKESC+12+(A(I,2)+6)*40,0
2125 IF(S(I)<>0)*(PEEK(S(I))<>46)THENS(I)=0
2126 IFS(I)<>0THEN2240
2130 SETA(I,1),A(I,2)
2140 NEXTI:RETURN
2200 IFA(I,1)=54THENPOKESC+39+(A(I,2)+6)*40,AL:GOTO2130
2210 P=SC+A(I,1)-15+(A(I,2)+6)*40:IFPEEK(P+1)=0THEN2400
2215 IFPEEK(P)=0THEN2230
2220 H=1:GOTO2130
2230 IF(S(I)<>0)*(PEEK(S(I))=0)THENS(I)=0
2231 POKEP+1,0:POKEP,AL:GOSUB2500:IF(S(I)=0)*(RND(1)<.6)THEN2130
2234 IFA(I,1)<27THEN2130
2235 IFS(I)=0THENS(I)=P-1:MUSIC"_#F1"
2240 B=S(I):P=SC+DX+2+DY*40:FORJ=1TO3:POKEB,46:C=B:IF(B>P-2)*(B<P+2)THENH=1
2250 IF(B-P)<0THENB=B+39:GOTO2280
2260 IF(B-P)<30THENB=B-1:GOTO2280
2270 IF(B-P)>0THENB=B-41
2280 IFPEEK(B)=64THENS(I)=0:J=3:B=0
2285 IFPEEK(B)=MATHENH=1:S(I)=0:Z=1
2290 IFH=1THENJ=3
2300 POKEC,0:NEXT:POKEB,46:S(I)=B:GOTO2130:REM DISPLAY CODE 46 = "."
2400 A(I,1)=INT(RND(1)*15)+62:A(I,2)=INT(RND(1)*11)+2
2410 GOTO2130
2500 J=SC+A(I,1)+785
```

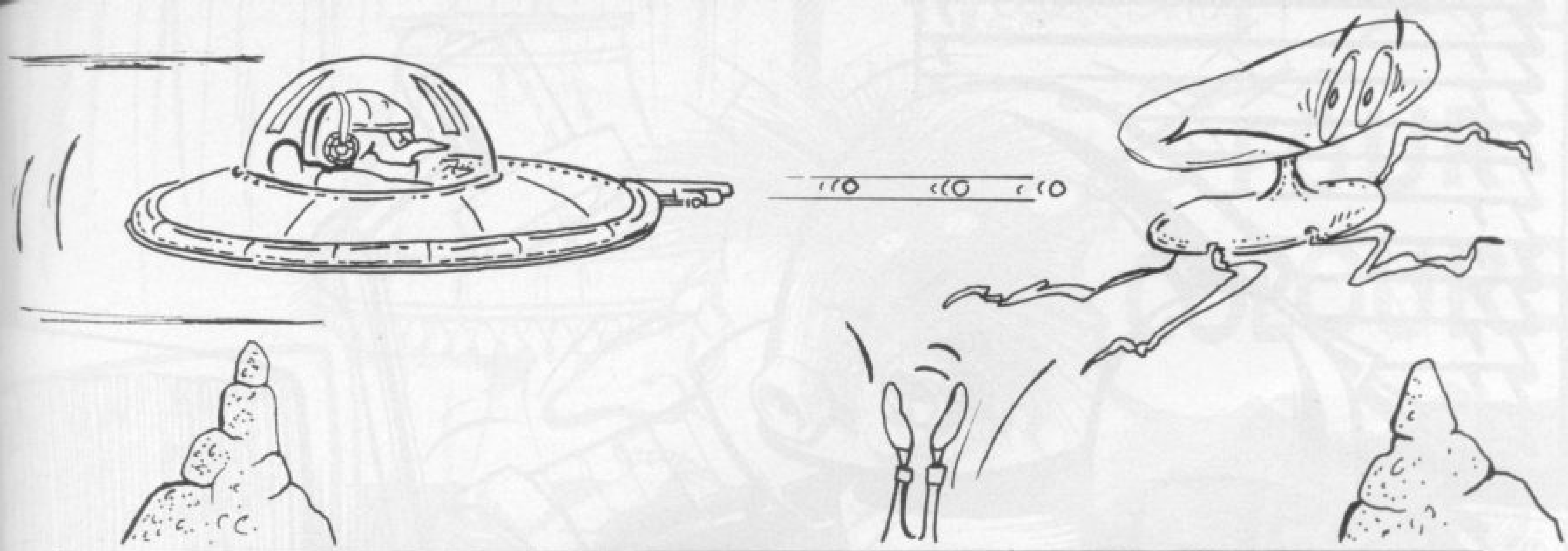
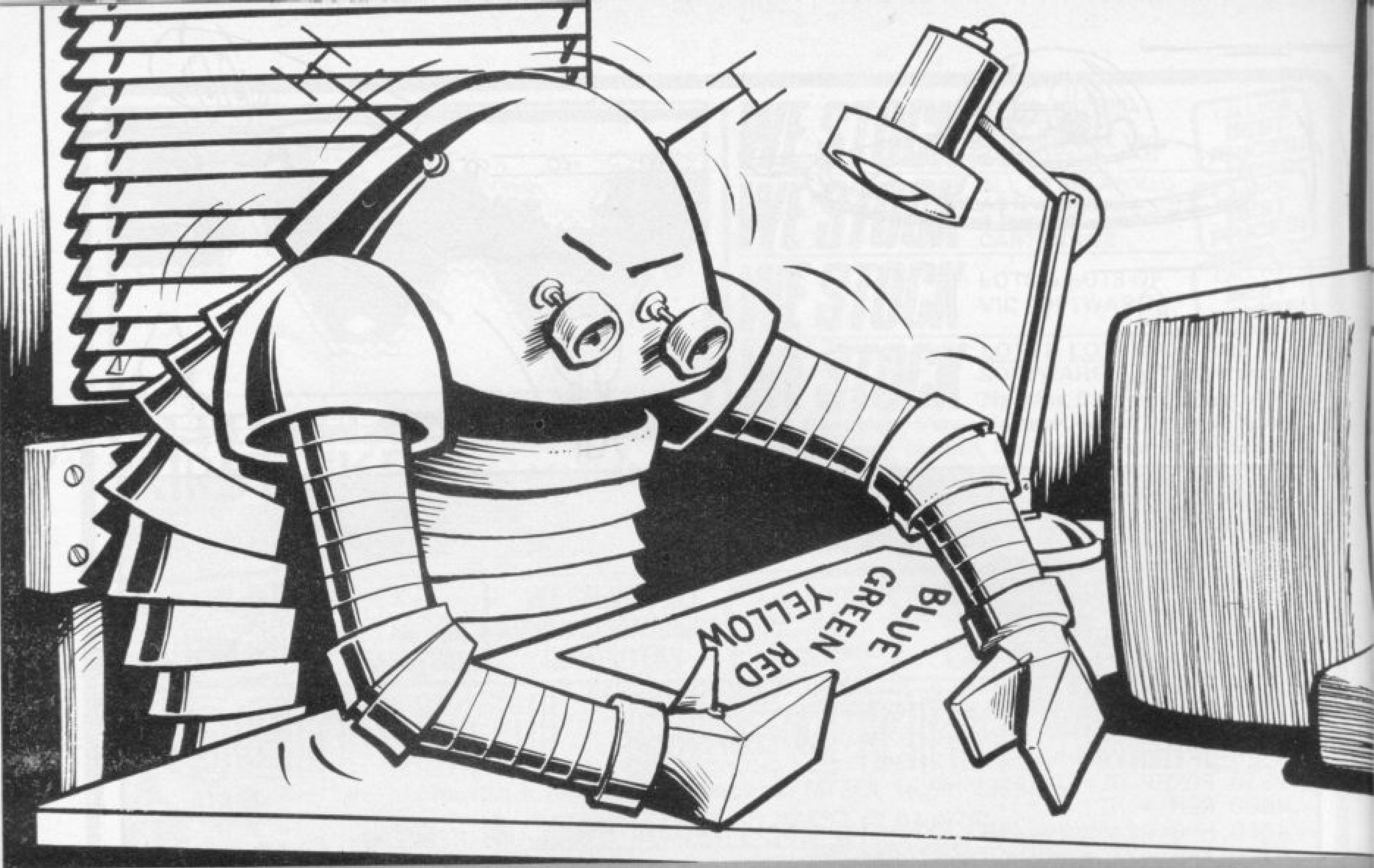


Illustration: Dorian Cross

```
2510 IFPEEK(J)<>MATHEN2540
2520 IF(P-J)=0THENH=1:Z=1
2530 A(I,2)=A(I,2)+1:GOTO2600
2540 J=SC+A(I,1)+825
2550 IFPEEK(J)<>MATHENRETURN
2560 IF(P-J)=0THENH=1:Z=1
2570 A(I,2)=A(I,2)+1
2600 POKEP,0
2605 P=SC+A(I,1)-15+(A(I,2)+6)*40:J=SC+DX+DY*40
2610 IF(P>DX-1)*(P<DX+4)THENH=1
2620 IFPEEK(P)=ALTHENA(I,2)=A(I,2)+1:GOTO2605
2625 IFPEEK(P)=MATHENH=1:Z=1
2630 POKEP,AL:RETURN
4000 REM * HIT *
4010 H=0:A$="YOUR SHIP WAS HIT":IFZ=1THENA$="A MAN WAS KILLED"
4020 X=DX*2+2:Y=DY*2:RESTORE
4025 PRINT"▣▣▣▣";TAB(12);A$:FORI=1TO1000:NEXT
4030 FORI=1TO40
4031 REM * SOUND *
4035 POKE4513,8:POKE4514,50-I:USR(68)
4040 A=INT(RND(1)*15):B=INT(RND(1)*15):IFE(A,B)<>0THEN4040
4045 IF(Y-B<0)THENNEXT:GOTO4070
4050 IFA/2=INT(A/2)THENSETX+A,Y+B:SETX-A,Y-B:E(A,B)=-1:NEXT:GOTO4070
4060 SETX+A,Y-B:SETX-A,Y+B:E(A,B)=1:NEXT
4070 MUSIC"Z"
4075 FORI=15TO0STEP-1:FORJ=0TO15
4080 IFE(I,J)=-1THENRESETX+I,Y+J:RESETX-I,Y-J:E(I,J)=0:GOTO4100
4090 IFE(I,J)=1THENRESETX+I,Y-J:RESETX-I,Y+J:E(I,J)=0
4100 NEXTJ,I:PRINT"▣":N=N-1:IFN=0THEN4500
4110 FORI=1TO1000:NEXT:GOTO190
4500 PRINT"▣▣▣▣▣▣▣▣▣▣▣▣▣▣";TAB(10);"GAME OVER"
4510 PRINTTAB(10);"ANOTHER GAME?"
4520 GETA$:IFA$=""THEN4520
4530 IFA$="Y"THEN185
4540 IFA$="N"THENPRINT"▣":END
4550 GOTO4520
4999 REM * DISPLAY RADAR *
5000 PRINT"▣┌──────────▄▀▀▀▀▀▀▀▀▀▀▄──────────┐";
5010 FORY=1TO6:POKESY,Y:POKESX,0:PRINT"|":POKESY,Y:POKESX,39:PRINT"|":NEXT
5020 PRINT"▣└──────────▀▄▄▄▄▄▄▄▄▄▄▀──────────┘";
5030 FORI=SC+320TOSC+720STEP40:POKEI,64:NEXT
5050 POKESY,23:PRINT"||||||||||||||||||||||||||||||||||||||||";
5060 PRINT"SCORE:          HIGH:          SHIPS:     ";:RETURN
5070 POKESY,24:POKESX,6:PRINTS;:POKESX,20:IFS>HSTHENSH=1:HS=S
5080 PRINTHS;:POKESX,34:PRINTN;" ";
5090 RETURN
5100 MT=MT+1
5110 IFMT>40THENMT=1
5115 FORI=1TO4:T(I)=0
5120 IF(A(I,2)>12)*(PEEK(SC+A(I,1)-15+(A(I,2)+6)*40)=206)THEN5140
5130 NEXT:GOTO5150
5140 T(I)=-1:NEXT
5150 POKESY,19:POKESX,0:PRINTM$(MT);:POKESX,DX:POKESY,DY:PRINTD$
5160 FORI=1TO4:IFT(I)=0THENNEXT:RETURN
5170 POKESC+A(I,1)-15+(A(I,2)+6)*40,206:NEXT:RETURN
```



RUNS ON A BBC MODEL A IN 16K BY TERRY ALLEN

There's a rainbow hidden inside your BBC micro — can you crack the code and bring a little colour to its circuits?

The computer selects four colours from a choice of six — red, green, yellow, blue, magenta and cyan — and hides them in four locations. You have to guess what four colours the computer has chosen and in what order they are held.

You get eight attempts to solve the puzzle. Each time you make an attempt the computer will tell you how many of the colours you have got right and how many you have placed in the correct position. As you may have already guessed this game is similar to that famous board game Mastermind.

The computer's choice will be revealed at the end of each game. Instructions on which keys to use are included in the program.

Will you be able to find you way over the rainbow?

```
    1 REM ***************************
    2 REM *  Listing courtesy  of   *
    3 REM *  Microage Electronics   *
    4 REM ***************************
   10CLS:Y=0:GOTO90
   20DEFPROCCOLOUR
   30FORW=0TO5:FORZ=0TO3
   40PRINTTAB(0,Z*6+W);CHR$(134-Z-Y);CHR$157
   50NEXT Z
   60FORV=1TO200:NEXT V:NEXTW
   70Y=Y+1:IF Y=3 THENY=0
   80ENDPROC
   90PROCCOLOUR
  100PRINTTAB(13,8);CHR$151;CHR$141;"F O U R";TAB(13,9);CHR$151;CHR$141;"F O U R
"
  110PRINTTAB(10,14);CHR$151;CHR$141;"C O L O U R S";TAB(10,15);CHR$151;CHR$141;
"C O L O U R S"
  120FORU=1TO3000:NEXT
  130PROCCOLOUR
  140PRINTTAB(13,8);SPC(7);TAB(13,9);SPC(7);TAB(10,14);SPC(13);TAB(10,15);SPC(13
)
  150PRINTTAB(7,9);CHR$135;"Do you want instructions?"
  160PRINTTAB(4,14);CHR$132;"Type 'Y' for YES or 'N' for NO"
  170Q$=GET$
```



Illustration: Terry Rogers

```
180IF Q$="Y" THEN210
190IF Q$="N" THEN720
200GOTO170
210CLS
220PRINTTAB(2,3);"The computer selects four colours";TAB(2,5);"from these six:
_"
230PRINTTAB(12,7);CHR$129;"Red";TAB(22,7)CHR$145;CHR$255
240PRINTTAB(12,9);CHR$130;"Green";TAB(22,9);CHR$146;CHR$255
250PRINTTAB(12,11);CHR$131;"Yellow";TAB(22,11);CHR$147;CHR$255
260PRINTTAB(12,13);CHR$132;"Blue";TAB(22,13);CHR$148;CHR$255
270PRINTTAB(12,15);CHR$133;"Magenta";TAB(22,15);CHR$149;CHR$255
280PRINTTAB(12,17);CHR$134;"Cyan";TAB(22,17);CHR$150;CHR$255
290PRINTTAB(1,19);"It holds them hidden in four positions"
300PRINTTAB(6,24);"Press any key for next page";
310R$=GET$
320PROCCOLOUR
330PRINTTAB(2,3);SPC(33)
340PRINTTAB(2,5);CHR$135;"You have to guess which colours and"
350PRINTTAB(2,7);CHR$132;"in which order they are held."
360PRINTTAB(2,9);CHR$132;"You can make up to eight attempts."
370PRINTTAB(2,11);CHR$132;"Each attempt is marked to show how"
380PRINTTAB(2,13);CHR$135;"many are of the correct colour and"
390PRINTTAB(2,15);CHR$135;"how many are also in the correct"
400PRINTTAB(2,17);CHR$135;"position.";SPC(12)
410PRINTTAB(2,19);SPC(38)
420S$=GET$
430CLS
440PRINTTAB(2,1);"To choose your colours press the"
450PRINTTAB(2,3);"number keys 1 to 6. They will print"
460PRINTTAB(2,5);"coloured blocks as shown below:_"
470PRINTTAB(5,7);CHR$129;"Key 1  Red";TAB(21,7);CHR$145;CHR$255
480PRINTTAB(5,9);CHR$130;"Key 2  Green";TAB(21,9);CHR$146;CHR$255
490PRINTTAB(5,11);CHR$131;"Key 3  Yellow";TAB(21,11);CHR$147;CHR$255
500PRINTTAB(5,13);CHR$132;"Key 4  Blue";TAB(21,13);CHR$148;CHR$255
510PRINTTAB(5,15);CHR$133;"Key 5  Magenta";TAB(21,15);CHR$149;CHR$255
520PRINTTAB(5,17);CHR$134;"Key 6  Cyan";TAB(21,17);CHR$150;CHR$255
530PRINTTAB(2,19);"The above code will be repeated at"
540PRINTTAB(2,21);"the foot of the playing page."
550PRINTTAB(6,24);"Press any key for the next page";
560T$=GET$
```

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```
  570PROCCOLOUR
  580PRINTTAB(2,1);SPC(32)
  590PRINTTAB(2,3);CHR$132;"The computer's choice will be        ";
  600PRINTTAB(2,5);CHR$132;"revealed at the end of each game."
  610PRINTTAB(2,7);CHR$135;"Don't forget you have only eight"
  620PRINTTAB(2,9);CHR$135;"attempts.";SPC(12)
  630PRINTTAB(2,11);CHR$135;"If you would like to read the"
  640PRINTTAB(2,13);CHR$135;"instructions again press 'Y'."
  650PRINTTAB(2,15);CHR$135;"Otherwise press 'N' and the game"
  660PRINTTAB(2,17);CHR$135;"will start.";SPC(10)
  670PRINTTAB(2,19);SPC(34);TAB(2,21);SPC(33);TAB(2,23);SPC(20);TAB(6,24);SPC(31
);
  680U$=GET$
  690IF U$="Y" THEN Y=2:GOTO210
  700IF U$="N" THEN720
  710GOTO680
  720CLS:PRINT
  730PRINT"  Attempt    Colours      No. correct in-"
  740PRINTTAB(4);"No.";TAB(13);"Chosen";TAB(24);"colour  position";
  750PRINTTAB(7,19);"Press the number keys for"
  760PRINTTAB(7);"the colours you choose as"
  770PRINTTAB(7);"shown below:-"
  780PRINTTAB(6);CHR$129;"1 RED";CHR$130;" 2 GREEN";CHR$131;" 3 YELLOW"
  790PRINTTAB(6);CHR$132;"4 BLUE";CHR$133;" 5 MAGENTA";CHR$134;" 6 CYAN"
  800A=RND(6):B=RND(6):C=RND(6):D=RND(6)
  810FORF=1TO8
  820G=0:H=0:I=A:J=B:K=C:L=D
  830FOR M=1TO4
  840IF M=1 THENPRINTTAB(4,1+F*2);F;
  850N$=GET$:N=VAL(N$)
  860IF N=0 OR N>6 THEN1250
  870PRINTTAB(10+2*M,1+F*2);CHR$(128+N);CHR$255;
  880IF N=A AND M=1 THEN H=H+1:GOTO920
  890IF N=B AND M=2 THEN H=H+1:GOTO920
  900IF N=C AND M=3 THEN H=H+1:GOTO920
  910IF N=D AND M=4 THEN H=H+1
  920IF N=I THEN G=G+1:I=0:GOTO960
  930IF N=J THEN G=G+1:J=0:GOTO960
  940IF N=K THEN G=G+1:K=0:GOTO960
  950IF N=L THEN G=G+1:L=0
  960NEXT M
  970PRINTTAB(26,1+F*2);CHR$135;G;TAB(35,1+F*2);H
  980IF H=4 THEN1010
  990IF F=8 THEN1110
 1000NEXT F
 1010FOR O=0TO4
 1020PRINTTAB(7,19+O);SPC(25):NEXT O
 1030ON F GOTO 1040,1050,1060,1060,1070,1070,1080,1080
 1040PRINTTAB(13,19);"Dead lucky!!":GOTO1150
 1050PRINTTAB(6,19);"Lucky! ";:GOTO1090
 1060PRINTTAB(3,19);"Excellent. ";:GOTO1090
 1070PRINTTAB(3,19);"Very good. ";:GOTO1090
 1080PRINTTAB(7,19);"Good. ";
 1090PRINT"Success at attempt No. ";F
 1100GOTO1150
 1110FOR O=0TO4
 1120PRINTTAB(7,19+O);SPC(25):NEXT O
 1130PRINTTAB(0,19);"Hard luck. no success after 8 attempts."
 1140GOTO1150
 1150PRINTTAB(12,20)CHR$(128+A);CHR$255;CHR$(128+B);CHR$255;CHR$(128+C);CHR$255;
 CHR$(128+D);CHR$255
 1160PRINTTAB(2);"The computer's choice is shown above."
 1170FOR U=1TO3000:NEXT
 1180PRINT"Do you want to play again? Type Y or N"
 1190P$=GET$
 1200IF P$="Y" THEN720
 1210IF P$="N" THEN1230
 1220GOTO1190
 1230PRINT:PRINTTAB(10);"Thankyou.   Goodbye        ";
 1240END
 1250PRINTTAB(9,VPOS+1);CHR$136;"Wrong key try again"
 1260FOR T=1TO5000:NEXT
 1270PRINTTAB(10,VPOS-1);SPC(21)
 1280GOTO0850
```

Adventure

FLAWED MASTER-WORK

You have written your masterpiece, and the first Adventurer to receive his cassette from your software house starts to play. Eventually he is confronted by a problem which you consider to be one of your more brilliant touches! Until he types in the necessary sequence of commands, he can go no further.

What you assumed was an obvious solution given some thought, is too obscure for your player and he is now hopelessly stuck. What is worse, he is becoming bored and about to tell all his fellow Adventurers so. How can you, the author, avoid this?

Ask some friends round to have a go at your Adventure while you are still writing it. Not everyone has a mind bent towards the kind of thinking needed to play Adventure, so you must select you guinea pigs carefully!

Invite them one at a time as you will want to see how they react individually. Sit with them and make a note of each problem with which they have unreasonable difficulty. Now you can decide where extra clues are needed.

The most direct way to introduce these is for each clue to be a response to the word HELP. Let us look at an imaginary example.

Consider the garden in which last month we grew a beanstalk. The garden was location no.4, a spade, bean and bucket were objects 5, 9, and 12 respectively. If the bucket is empty the flag C(12) will be 2. Figure 1 shows a series of possible steps in the player's logic, and a suggested response from the computer to the command HELP.

If control passes to — say — line 4000 when HELP has been decoded by the reply decoding routine, then:

```
4000 ON LN GOTO 4100,4200,4300,
4400,4500
```

will access a different HELP routine for each location. (Each problem will be location dependent.)

Here the location is 4, so control will pass to line 4400.

```
4400 IF C(5) = 2 THEN LET Q1$ =
"NEEDS DIGGING": GOTO 100
```

Arranging for C(5) to be increased to 3 when a hole is dug, we can continue:

```
4410 IF C(5)=3 THEN LET
Q1$="HOLE IS BEAN-SIZED":GO-
TO 100
4411 REM GOODNESS! HASN'T HE
FOUND THE BEAN YET?
```

As C(5) is again increased by 1 when the bean is planted, we can use this fact not only in the PLANT routine, but also for HELP:

```
4420 IF C(5)=4 THEN LET
Q1$="GROUND IS VERY DRY":
GOTO 100
4421 REM YES — IT WILL NEED
WATERING! WHEN DONE C(5)=5
4430 IF C(5)=5 THEN LET Q1$=
"SOMETHING AT THE TOP": GOTO
100
4431 REM CLIMB IT FOR
HEAVEN'S SAKE!
4440 LET Q1$ = "SORRY I CAN'T":
GOTO 100
```

C(5) will be increased to 6, and therefore this line will execute by default when the beanstalk is chopped down later.

Finally, all the IF statements can be avoided by the use of ON . . GO-TO:

```
4400 ON C(5)−1 GOTO 4105,4410,
4420,4430,4440
4405 LET Q1$ ="NEEDS DIGGING":
GOTO 100 . . . etc.
```

FIGURE 1

PLAYER'S ACTION	PLAYER THINKS	REPLY TO HELP
Arrives in garden	Oh! A garden! What do I do?	Needs digging
Finds spade, goes into garden, digs	Hello! a hole! What use is it?	Hole is bean-sized
3 months later, finds bean & plants it in hole	How disappointing Only a beanshoot	Ground is very dry
3 months later, finds water & bucket, waters beanshoot	What on earth can I do with a huge beanstalk?	Something at the top

The date is April 2nd 1913. A telephone in your Scotland Yard office rings. "Inspector Strade here. There's been a murder at Crowley Manor." So the mystery starts.

By two word commands you find yourself on the street, there's no alternative. You seem powerless but to follow the plot. A hansom cab pulls up. The driver smiles at you. Nothing to worry about, he is just trying to lure you to take his cab to Crowley Manor.

Now I'm the awkward type and did everything I could to avoid using that cab. But eventually I had to let events overtake me.

I was convinced that the game was going to solve itself, but it was not to be.

After stumbling over a body and slipping on something slimy, I found the game became quite difficult — mainly due to the inconsistency of the form of the commands recognised.

The worst offender was a hole I wished to traverse. After I gave up, Neil, my 14 year old son tried out his American on it — CLIMB THRU HOLE — and succeeded! I was so frustrated I left him to solve the mystery!

The Curse of Crowley Manor runs on a TRS-80 and Video Genie in 16k, and is obtainable from Calisto Computers.

Savage Island Part Two starts where Part One left off, and for me doesn't go much further — yet! A neon sign proclaims: "Part 1 will seem like a piece of cake compared with what you are about to go through!"

That sign is difficult enough to get to! Can anyone help?

Not having played Golden Voyage, Scott Adam's latest, I was unable to offer any advice to a desperate reader who contacted me recently. Intrigued, I had a go, and would now put money on where he is stuck. Please "STEP UP" Mr Reader and tell me if I'm right!!

By KEITH CAMPBELL

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rum



The ZX Printer – available now

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ZX Spectrum

Available only by mail order and only from

sinclair

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Tel: Camberley (0276) 685311.

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BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST – use the no-stamp needed coupon below. You can pay by cheque, postal order, Barclaycard, Access or Trustcard.

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Graphics



MATHS IS ALL YOU NEED . . .

One aspect of computer graphics that seems to concern many of the people interested in it is the idea that it is necessary to know a good deal of mathematics.

To see how much mathematics it is necessary to know in order to generate useful graphic displays on a microcomputer it is useful to examine the way in which the user is producing them.

In terms of the mathematics to be used, the two extreme positions are those of the programmer who writes all his own graphics software to generate the displays he wants on his system, and that of the person who simply uses an existing program as a tool for making the displays he wants for his own purposes.

If we examine these extremes, the writer of a graphics program must know all the mathematics necessary to achieve his effects because the mathematics must be built into the program itself.

The basic area of mathematics that is called on is, of course, geometry. Two-dimensional geometry is studied at school by most people, and is found as simple as anything in mathematics by most people simply because it can be treated in a pictorial way.

Three-dimensional geometry is usually found to be a good deal more difficult mainly because the visualisation of solid objects and shapes is not easy for most people.

Other mathematical techniques include the calculus and matrices. Since the use of the matrix is included in all modern maths syllabuses, this is an area that is familiar to many. More sophisticated forms of geometry that are of great value are differential geometry and homogenous coordinate geometry.

The graphics programmer writes programs for the user at the other of our extremes who simply uses existing programs.

Such a user needs to learn how to run a particular program: he needs only a qualitive and mathematical appreciation.

Learning to use a graphics program may not require an entirely negligible effort, but it is clearly a far simpler task than mastering the mathematics that went into the writing of the program itself.

Programs that can be used in this way have been written for applications that include generating and storing screen displays for later incorporation in other programs, such as games, and computer-aided design programs in which a graphic display enables the user to examine the results of his design efforts.

Programs for displaying three-dimensional shapes can have many uses, notably in education, but also for example, for use by architects to display models of buildings in the planning stage to their clients.

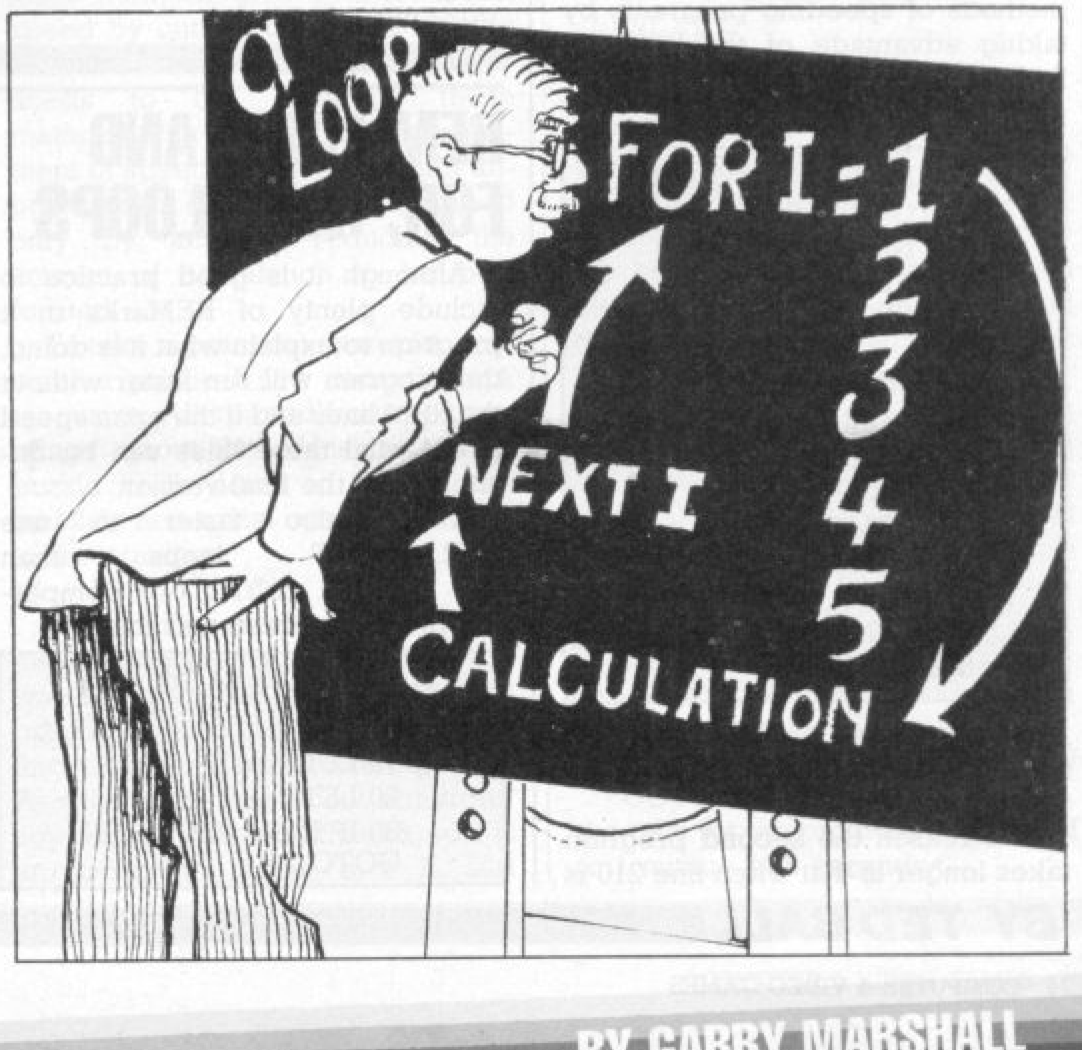
Another way to produce graphics which requires the use of no mathematicals at all is to use a graphics tablet such as is available for the Apple and Atari machines.

With such a device, shapes can be entered into the computer by tracing them on the digitising surface of the tablet or by building them up with lines in the ways provided by the menu of commands possessed by the tablet and its software.

The number of graphics input devices for microcomputers is increasing: at the recent Pet show a digitiser that is usually used with mainframe computers was shown interfaced to a Pet. Also, more graph plotters are available for micros, so that graphic results can be saved in permanent form.

In between the two extremes it is necessary to be familiar with a certain amount of mathematics to amend graphics programs that do not do exactly what you want. To make the change it is necessary at least to understand the mathematics incorporated in the relevant routine.

So the answer to the application "How much mathematics do I need for graphics?" is that you need quite a lot to write your own graphics programs, that a little, at least, is needed if you need to modify graphics programs, but that none at all is needed if you are content just to use some of the many fine graphics programs that are available.



BY GARRY MARSHALL

PRACTICAL PROGRAMMING

FAST THINKING THE QUICK WAY

When entering programming competitions like Beat the Bugs it is useful to make an early impression on the judges by giving your program a fast solution time.

This month I am looking at methods for making programs run faster. This is because I have recently bought a Spectrum and, although I am generally happy with it, it is much slower than the Compukit I am used to.

Although computers can perform simple calculations with no noticeable delay, the calculations do take a finite time and when there are thousands or millions of calculations to be done it may be necessary to reduce the delays.

The main reason for needing to speed up a program are moving graphics that must move smoothly instead of jerkily and to cut down the waiting time in "number crunching" programs that take hours or days performing millions of calculations to solve a mathematical problem.

There are several simple methods of speeding programs by taking advantage of the way the Basic interpreter works. Consider programs (1) and (2) below:

```
(1) 200 FOR I = 1 TO 1000
    210 GOSUB 500
    220 NEXT I
    230 STOP
    500 RETURN

(2) 200 FOR I = 1 TO 1000
    210 GOSUB 500
    220 NEXT I
    230 STOP
    300 REM
    310 REM
    .......
    390 REM
    500 RETURN
```

Timing these on the Spectrum gave 7.5 seconds for (1) and 8.5 seconds for (2).

The reason the second program takes longer is that when line 210 is executed the Basic interpreter searches for line 500 by looking through the whole program, starting at the beginning and checking each line number until it finds the line it is looking for. We can see from this that a program will run faster when the most frequently used subroutines are placed near the beginning of the program.

If the saving in speed due to having subroutines near the beginning of the program is really significant the program could be laid out as follows:

```
 10 GOTO 500
100 REM Most frequently used
    sub-routine
    ...
190 RETURN
200 REM Next subroutine
    ...
    ...
500 REM Main Program
    ...
    ...
```

The interpreter will handle GOTO in the same way as GOSUB, searching through the line numbers until it finds the one it is looking for, and it is possible to speed up a program by arranging for the destinations of GOTO statements to come near the beginning of the program.

REM LINES AND FOR, NEXT LOOPS

Although it is good practice to include plenty of REMarks in a program to explain what it is doing, the program will run faster without the REM lines and if the extra speed is essential these lines can be deleted from the final version.

It is also faster to use FOR...NEXT loops than IF...THEN...GOTO... Comparing programs three and four:

```
3) 10 FOR I = 1 TO 1000
   20 NEXT I
4) 10 LET I = 1
   20 LET I = I + 1
   30 IF I <= 1000 THEN
   GOTO 20
```

program three takes 4.4 seconds, while program four takes 8.2 seconds.

A simple counting loop as in program four would normally be written as a FOR...NEXT loop in the first place. However, where a loop would normally be written with IF...THEN...GOTO... there are tricks we can use to replace the loop by FOR...NEXT. For example, suppose we have

```
110 (start of loop)
190 IF A<>B THEN GOTO 110
```

we could eliminate the slow GOTO by writing

```
100 FOR I = 1 TO 1 STEP 0
110 (start of loop)
    ...
190 IF A = B THEN LET I = 2
200 NEXT I
```

Because we have STEP 0 in line 100 the FOR...NEXT loop would not normally finish but when A = B in line 190 the value of I will be changed to a value greater than the upper limit of the loop and the loop will then finish.

Another method of speeding up programs can be seen from the following example:

```
5) 10 LET A=O
   20 LET B=O
   ...
   80 LET H=O
   100 FOR I = 1 TO 1000
   110 LET A = A
   120 NEXT I

6) replace line 110 in (5) by 110
   LET A = H
```



BY TED BALL

Program five takes 7.9 seconds, program six takes 8.5 seconds.

The reason for this difference is in the way the variables are stored inside the computer. The Basic interpreter maintains a table of the variable names and the current values of the variables, and whenever it comes across a new variable name it is added at the end of the table. When the interpreter needs to use a variable it starts looking at the beginning of the table and works through until it finds the name it is looking for. Thus, in program (5) the "A" on the right hand side of the assignment was found on the first check, but in (6) the interpreter had to go through "A", "B", "C",. . . until it came to "H".

FACT AND FICTION ABOUT VARIABLES

You may read in some places that using variables instead of numeric constants will make a program faster. This is true in Microsoft Basic, used on the Pet, Apple, Compukit, and many other computers, but it is not true in Sinclair Basic, used on the ZX81 and Spectrum. Consider program (7), obtained by replacing line 110 in (5) by

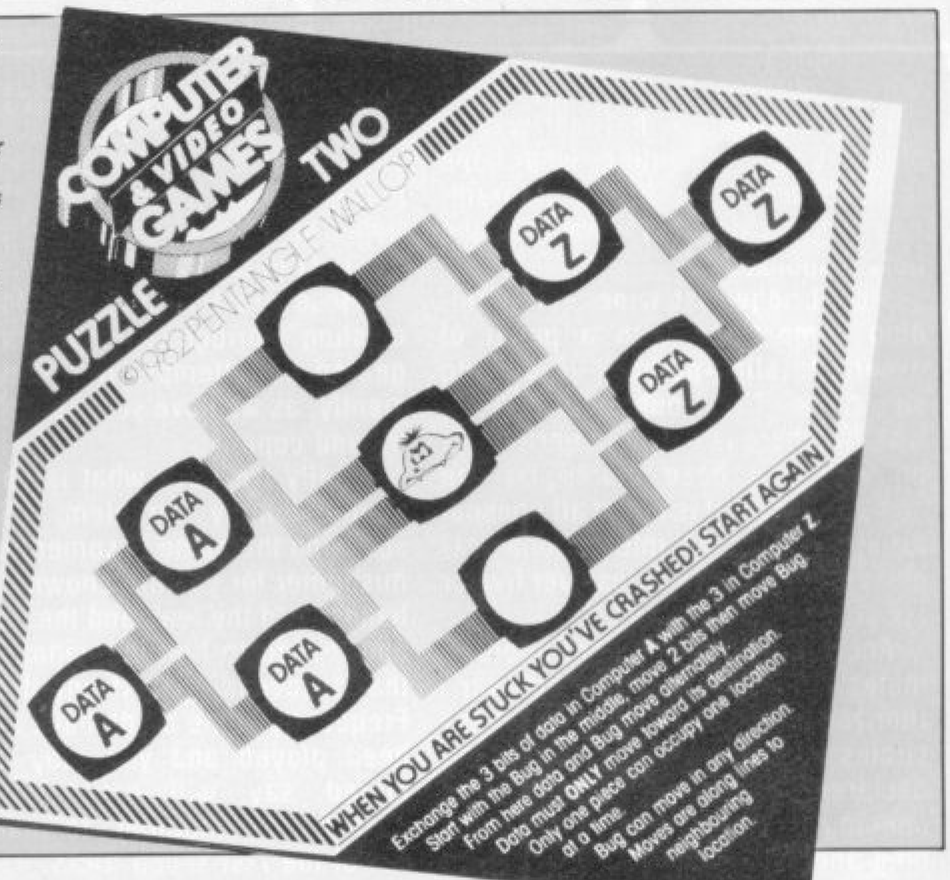
110 LET A = O

On the Spectrum, program seven takes 7.7. seconds, and is thus faster than five and six; however on the Compukit the times for programs five, six and seven are 2.7 seconds, 3.0 seconds and 3.3 seconds respectively (you can see from these comparative timings why I am not happy with the speed of the Spectrum).

The reason that variables are faster than constants in Microsoft Basic but not in Sinclair Basic is the way the program is stored in the computer. In Microsoft Basic a constant is stored as the character codes for the individual digits and the string of character codes is converted to a binary number every time the constant is used; the conversion takes longer than looking up the variable table to find the value of a variable, which is stored as a binary number.

In Sinclair Basic, however, although the string of character codes for the digits of a number are stored in the program the corresponding binary number is also stored inside the program, and can be obtained faster than a value from the variable table.

The Beat the Bug puzzle which called for fast programs — and fast thinking!



The methods considered above do not actually reduce the amount of calculation done by a program; these methods give an increase in speed by cutting down the amount of "housekeeping" the interpreter needs to do. Although these methods can give good improvement in speed, really significant improvements can usually be obtained only by actually reducing the amount of calculation to be performed.

To take a practical example, consider a puzzle I saw recently in a magazine. Abstracted from the trimmings about childrens' ages the puzzle boils down to finding the smallest non-trivial integer solutions to the equation

$a^3 + b^3 = c^3 + d^3$

The obvious method to try first is just to compare the values of the two sides of the equation for all possible values of a, b, c, d, until we find values that satisfy the equation. As the puzzle was about childrens' ages we can assume that 16, say, is an upper limit for a, b, c, d, and write a simple program to test all values up to 16.

```
10 FOR A = 1 TO 16
20 FOR B = 1 TO 16
30 FOR C = 1 TO 16
40 FOR D = 1 TO 16
50 IF (A=C) OR (A=D) THEN
   GOTO 70
60 IF A*A*A + B*B*B = C*C*C +
   D*D*D THEN GOTO 110
70 NEXT D
80 NEXT C
90 NEXT B
100 NEXT A
110 PRINT A;" ";B;" ";C;" ";D
```

On the Spectrum this takes 1 minute 28.8 seconds, and since it is only the answers that are needed and the program would only be used once, we would normally not bother to try making the program faster.

However, we can note that A*A*A, B*B*B, C*C*C are recalculated in line 60, inside the inner loop, although their values do not change every time D changes. If we alter the program by adding:

```
15 LET M = A*A*A
25 LET N = B*B*B
35 LET P = C*C*C
```

and changing line 60 to

```
60 IF M + N = P + D*D*D THEN
   GOTO 110
```

the time for the program is reduced to 1 minute 10.8 seconds.

BRIDGE

BY ALAN HIRON

When panels of bridge experts are usually divided on the best way to play any given situation, what hope is there for the poor bridge programmer of teaching his computer the best responses?

Most bridge magazines run a bidding competition with a panel of experts tackling perhaps 10 bidding situations. The trouble lies in the fact that there is only a majority vote on which to base marks for the competition — it is not at all unusual for a panel of 24 international experts to share their votes over five or six possible bids!

Another type of problem approximates to the "over-the-boarder" (horizon effect) that you find in chess circles — in bridge you are given declarer's hand and dummy, the opening lead and any opposition bidding and are invited to find the *best* line of play. Sometimes but rarely you are told that there is a 100% play (a "sure tricks" hand); sometimes you are just required to find the best percentage play.

These are the problems that the existing bridge computers are geared to attempt. Not very efficiently, as we have seen, but they do try and cope.

Finally we have what is called a double-dummy problem. Strictly speaking the name is something of a misnomer for you are shown all four hands, told the lead and the contract and invited to find the winning play that succeeds against any defence. Frequently some cards have already been played and you may be required, say, with seven cards in each hand remaining, to make six out of the last seven tricks.

So how does a computer cope?

SEARCH FOR A SOLUTION

Finding ways a computer can overcome bridge problems presents many unique difficulties.

The "exhaustive search" technique which helped chess computers "Play and mate in two moves" over 15 years ago, has limited possibilities when it comes to bridge.

Consider a full bridge hand — in how many ways can it be played? Much depends on the distribution of the particular hand but if you argue that the nth trick can be started in (14-n) ways and that the other three players (on average) will be able to follow suit with about quarter of their remaining cards then at least we will have an estimate. It looks like $13 \times 3 \times 3 \times 3$ for the first trick, $12 \times 3 \times 3 \times 3$ for the second, $6 \times 2 \times 2 \times 2$ for the eight, $1 \times 1 \times 1 \times 1$ for the last.

That is roughly $13! \times 3!^3 \times 3!^3 \times 3!^3$. And that is — but I'll leave you to work it out . . . With present computing power it is obviously hopeless to use this method on full hands.

Suppose that we consider a simple three-card problem "South is on lead, there are no trumps and he has to make two of the last three tricks."

	S 8 7 6	
S K J 10		*S* 5 4 3
	S A Q 9	

You got there I hope? South must lead S9. West has to win and now South makes the last two tricks. Childish by human standards for no other play succeeds unless West does something silly. What about an exhaustive search? It is not too difficult here: as all of the cards are spades, the possible plays to trick 1 are $3 \times 3 \times 3 \times 3$ (=81) in number; there are $2 \times 2 \times 2 \times 2$ (=16) play to trick 2 and no problem about the third trick. So 1296 possibilities exist.

The human analyst will notice at once that he doesn't have to worry about all these — as far as winning tricks is concerned East's cards are all identical in value and so are North's as far as his hand is concerned.

An ingenious programmer might profitably take advantage of this but now you have the old problem — a lot of program to test for this sort of possibility, or is a shorter program that races through all the combinations quicker in the long run?

If you think about the logic of solving the simple problem above, then you must think on these lines:

1) There are 6×6 ways for North-South to play their cards.
2) Associated with each of these 36 ways there were 36 ways for East-West to play their cards. Calculate the number of tricks made in every case. If, for any of the North-South possibilities, at least two tricks are made *whatever East-West try*, then the solution has been found.
3) There may be more than one solution, so the search continues.



In this way all possibilities are explored and a definite answer (or answers!) obtained. Even this can be an irritating affair to program and there are the obvious complications of more cards in each hand, all four suits being involved, and the possibility of a trump suit.

In the next article I will consider how the "exhaustive search" can be reduced to a "tree search". The idea is that once a "branch" has been found to be unsuitable, it isn't explored any further. There will be the certainty of far more subtle programming being required but the length of the calculation may be reduced by several orders of magnitude. Then we will be in business for solving six or seven card (per hand) problems but still not tackling a full deal.

FAST FURIOUS AND LOTS OF FUN!

STARBLAZER

You are at the controls of a supersonic Starblazer jet fighter on a mission to destory enemy radar bases which are ruining your air force's chance of a successful mission.

The bases are particularly hard to hit as you can only drop your bombs when you are close to the ground, running the risk of crashing into the pylons which flank the radar dishes.

Points can also be scored by bombing the buildings in and around the radar installation — though this of itself will not qualify you to go on to mission two, and attempt to bomb the supersonic tank.

Picking off these buildings is, however, good bombing practice — and I was soon able to work out just the right height and position on the screen to hit the radar bases at least three out of five times.

Once you have hit a radar base your Starblazer zooms up to the top right hand corner of the screen and mission two flashes up the message "destroy supersonic tank". This, alas, is easier said than done.

First you must dodge or shoot a barrage of missiles which fly at you at great speed moving left to right across the screen. If you survive this onslaught you can then attempt to dive-bomb the supersonic tank which — maddeningly — seems to be always just out of your bombing range.

Missions 3, 4 and 5 were unfortunately beyond the ken of this particular Starblazer — but for the benefit of any ace pilots who may be reading this you have to bomb the ICBM — a mushroom like structure — attack a more advanced tank which fires back. If you survive all that you get a chance to wipe out the H.Q.

I have a particular affection for this type of game and Starblazer was no exception. It offers fast action and sufficient difficulty to make you keep coming back to improve your performance. I played the game using the keyboard though it can be played with a joystick — which I would imagine would greatly improve playability.

Starblazer runs on Apple II in 48K. It is available from the London based Software House at £19.

- **Getting started** 9
- **Value** 7
- **Playability** 9



Illustrations: Jon Davis

A HAUNTING CHALLENGE

SNAPPER

Ghosts may come and go but Acornsoft's Snapper will haunt you for some time.

This is Pacman as enjoyed in the arcades, with just a few changes which will probably go unnoticed by many who buy this cassette. The maze has undergone a few changes (programmer's licence) but the tunnel is still there. So is the long and dangerous stretch at the bottom of the screen.

The ghosts are as perfect as possible, eyes swivelling in the direction they are heading.

On being eaten their eyes return to the house in the centre of the screen and the blue edible specimens are as arcade players will remember them.

Perhaps the most noticeable change is with the energy dots whjch when transversed during ghost-chasing, are not consumed.

Keyboard control soon becomes familiar and then the family tussle to put their names on top of the high-score chart.

It's all there, music, lights and action for £9.95 inclusive of VAT for the BBC Model B.

- **Getting started** 7
- **Value** 8
- **Playability** 9

The complete guide to discovering if you'll enjoy the cassette or disk reviewed:

Getting Started refers to loading instructions, loading difficulties and whether or not the game is easy to understand.

Value is the value-for-money side. Does the cassette or disk appear well presented and put together? Does it make good use of the machine's abilities?

Playability is probably the most important mark to look at. Is the game a good example of its type? If it is an original idea, will it succeed in holding your attention.

The main bulk of the review is the place where our games testers can give their own opinions on the offering but the marks seek to provide an accurate buying guide.

SLOW INVADERS WILL FAIL TO CONQUER EARTH . . .

VIC INVADERS

You won't need to be a king of the arcades to repel this squadron of Vic Invaders.

The game is written in machine code and apparently has five skill levels — though I could discern no great difference between skill level one and five.

The game gives you no mystery flying saucers to shoot at — thus ignoring the most enjoyable aspect of the arcade version of Space Invaders.

It is also very easy to stay alive. All you have to do is keep the space bar depressed and a constant stream of missiles will cancel out the missiles of the advancing fleet. I almost managed to wipe out an entire fleet by keeping the space bar depressed without moving right or left.

Another disappointing feature of this game is that you cannot fire and move your gun turret at the same time. This makes it impossible to zoom in and hit that last invader on the run with style.

The game could also have been greatly improved if the high score display kept a running total of high scores, rather than giving every last score as the current high score, whether it was higher or not.

The producers must have realised it was rather easy and give just one life, instead of the usual three.

The missiles in this game also left a little to be desired — jerking skywards and pausing mid-screen for breath.

Vic Invaders is available from Stockport based Bridge Software. It costs £6.90 and runs on the unexpanded VIC-20.

- **Getting started** 8
- **Value** 2
- **Playability** 2

A NICE LITTLE MOVER

ZX CHESS

There was something very sinister about the way this chess program went about assuring itself of a good review.

My first encounter with it came on level two where it boasted a 35 second response time to the average move. (Careful timing put it a little above this but perhaps my moves were just above average).

It started brightly despite not having a book opening repertoire to fall back on. Snapping up my queen's bishop's pawn gambit, it held onto the extra piece tenaciously enough during the opening and also developed its pieces well. Doing, just enough, in fact, to make me think I had found a worthy opponent and then, when it sensed I was ripe for the taking, it capitulated to a particularly sweet queen and bishop attack and allowed itself to become mated soon afterwards so that I didn't get bored by the endgame.

The result: one reviewer feeling particularly pleased with himself and more than willing to write nice things about the opponent which had just given in so graciously.

Further testing on its other levels still suggested that the 35 second response game is the best to play unless you have something to do whilst awaiting in next move in the higher levels.

At lowest response level (five seconds) I felt I was getting my own way rather too easily.

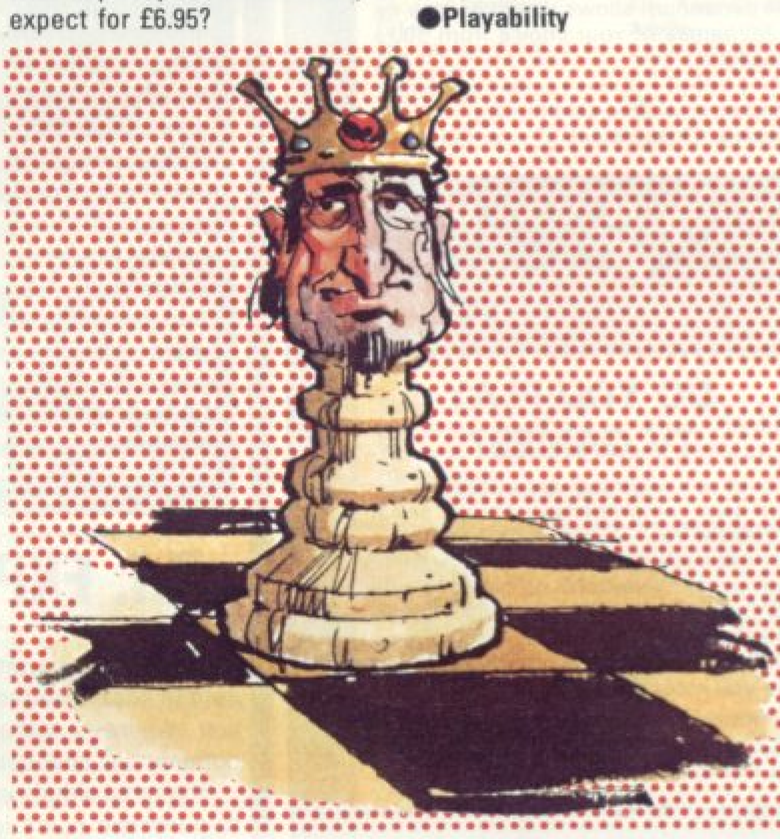
The screen disappears while the computer is thinking, so you will need your own board to study if you are going to take the game seriously. The computer display does take a little getting used to, as does algebraic notation but the extensive instructions are a help here.

The computer will not allow illegal moves, it will let you play black, it understands castling and en passant.

I miss not being able to play through my favourite openings with impunity but what can you expect for £6.95?

Sinclair ZX81 Chess is produced for the 16K machine by Psion.

- **Getting started** 9
- **Value** 8
- **Playability** 6



DEADLY DEATH SHIPS

OMEGA RACE

Omega Race is that rare thing in computer software — a truly compulsive game.

The year is 2003. Aliens are attacking the city of Komar. You must defend the city in your arrow shaped space craft.

The game is played using VIC paddles which can be purchased from most VIC dealers at around the £14 mark.

The ship is quite difficult to control and at first appears to float around the screen at will. Only after several goes did I discover that the ship will zoom forward in the direction of the arrow if the fire button is kept depressed.

The paddle dial turns the ship full circle — the secret being to spin and fire as you move forward — just as in Asteroids. But go steady — as once you have chosen a certain course you will have to fire quickly to clear all the aliens out of your way.

Five different types of alien track you around the rectangle in the centre of the screen which displays your score, the current high score and the number of ships you have left.

Most deadly are the Death Ships which spin around the screen at great speed and can shoot and manoeuvre.

Command ships can also shoot and track you around the rectangle for the most part of the game multiplying in number as the game progresses. Droid ships are slower and easier to kill than Command ships though they will track you with dogged persistance.

Just to make things a little more difficult there are also two types of mines — Photon mines and vapour mines dotted around the screen, which are easy to crash into as you race around the screen chasing a Death Ship.

The game features an invisible force field at the right and left of the screen which, if you are a skilled player, you can use to your advantage — bouncing off it at full speed and then swivelling to shoot — or to take the corners at full throttle.

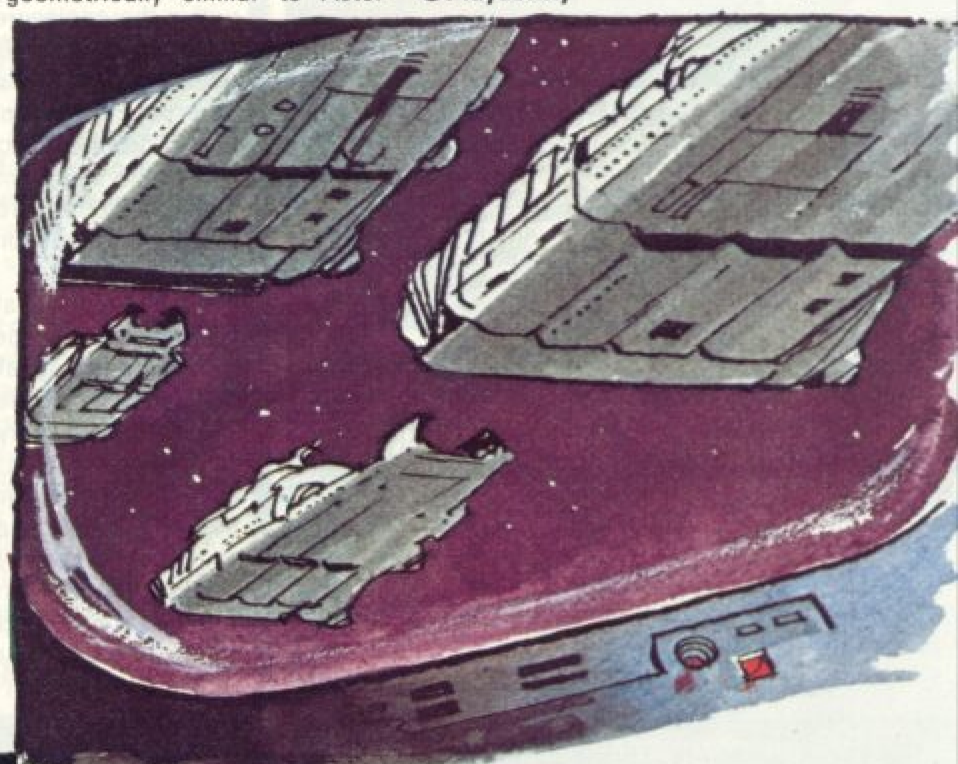
Omega Race is practically identical to the arcade game of the same name. Playing the game on your VIC-20 is every bit as good as playing the game in an arcade.

This is a relatively simple game with not particularly inspiring graphics — they are very geometrically similar to Asteroids graphics. But for sheer playability Omega Race is by far the best game I have played on the VIC-20. Nothing else comes close.

Omega Race is the latest addition to Commodore's range of solid state plug in games. Available from VIC dealers at £24.95 inclusive.

- **Getting started** 7
- **Value** 8
- **Playability** 9

Illustrations: Jon Davis



HARDCORE

A GAMES PLAYER'S GUIDE TO THE TEXAS T.I. 99/4a

TEXAS — AN AMERICAN FAVOURITE

The Texas Instruments 99/4a is a recently re-vamped version of the 99/4 which, in 1978 represented the giant American electronics firm s first venture into the microcomputer field. Since then the T.I. 99/4a has established itself as one of America's more popular home computers.

The basic package is a 16-bit (compared to the more common 8-bit) microprocessor which gives you 16K of RAM memory expandible up to 48K.

The T.I. is a colour computer with 16 foreground and background colours although the machine will function adequately on a normal black and white television.

The keyboard has electric typewriter style keys — 48 of them — with control and function keys (user definable), full upper and lower case capability, alpha lock, and auto repeat keys.

The computer also has impressive sound capabilities — five octaves, three simultaneous tones, plus noise generator.

It is fairly compact measuring 15×10 inches, and $2\frac{1}{2}$ inches high. It weighs about 5lbs and runs off 240 volts in the UK.

The machine is now in the shops at around the £200 mark, the price having dropped by £100 in the last 12 months. It seems a fair assumption as well that the price will continue to fall with rumours of a drop in price of the VIC-20, the appearance of the Spectrum at £125 and the continued success of the Atari 400

T.I. EXPANSION

The T.I. has a variety of peripherals available to enable you to expand the system as you require — either for home use, or for commercial applications.

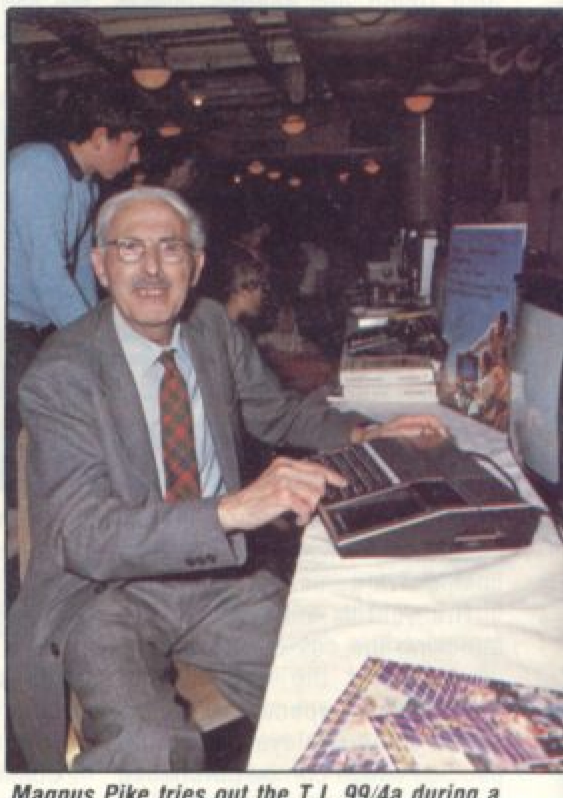
The most simple expansion to your T.I. is to purchase some leads and plug in your cassette recorder — this enables you to store your own programs, or to purchase other pre-recorded cassettes that are available.

The Peripheral Expansion System is a show-box shaped unit in brushed aluminium with eight slots for peripheral board-type cards, one of which connects the system to the computer console. You simply plug in the required function card, for example Extended Basic, Mailing List, or one of the other cartridges. The system will also enable you to use one disc drive within the enclosure. This costs £190.

The T.I. Disk Memory System enables you to save or load Basic programs for later use. It incorporates a disc controller and up to three disc drive units. The discs are single sided, single density, $5\frac{1}{4}$" mini-floppy diskettes each storing up to 90,000 bytes of information. The T.I. DMS costs £240.

A 400 word vocabulary is built into the T.I. Solid State Speech Synthesizer. The words are individually stored on chips and are reproduced electronically through a loudspeaker. The synthesizer is useful for reciting instructions, enhancing games and educational programs. As might be expected from a machine from Texas it speaks with a pronounced U.S. accent. The Speech Synthesizer is available at £99.00.

T.I. also manufacture an Interface Card which enables you to connect a wide range of computer accessories to your



Magnus Pike tries out the T.I. 99/4a during a recent Texas press conference

basic console — some of which are manufactured by Texas, but the Interface Card enables you to use accessories from other manufacturers as well. The Interface Card is a communications link which enables you to exchange and receive data over the telephone line with other computers. It is available at £130.

The T.I. printer plugs in directly to the computer console and does not require an Interface Card. It prints data in a 32 column, 5 × 7 dot matrix characters at a speed of 30 characters per second. The machine has 32 graphic symbols (pre-defined) and can be used to plot — printing on thermally sensitive paper.

T.I. manufacture a set of Wired Remote Controllers — joysticks, which plug into the

HARDCORE

A GAMES PLAYER'S GUIDE TO THE TEXAS T.I. 99/4a

back of the computer console. They are made of hard black plastic with the fire button mounted above the lever. Available from T.I. dealers at £24.00.

All prices are recommended by T.I. — but you would be well advised to shop around as prices vary from one retailer to another.

SPRITELY BASIC

The TI 99/4a runs under T.I. Basic when no solid state cartridges are plugged into the software port. The main difference from Microsoft is that T.I. Basic does not have the PEEK and POKE functions, familiar to most other microcomputer users.

An Extended Basic is produced by T.I. which plugs into the software port on the front of the console. Extended Basic has all the features of Basic with an additional 40 commands and sub programs. Extended Basic also has "Sprites" or programmable moving characters.

T.I. Logo is an educational language designed mainly with young children in mind. It uses an easy to understand set of commands and instructions within computer illustrated exercise. It requires the expansion system, disc drives, and will be aimed mainly at the primary school market.

UCSD-Pascal is an advanced language for the more experienced programmer. You will need the 32K Byte RAM-expansion and the T.I. Disc Memory System.

The software package contains the Pascal compiler to translate Pascal programs into P-code, an editor, filer and utilities package for screen editing and file management and an Assembler linker package for developing TMS 9900 Assembly Language programs.

The P-code compiler enables you to run programs which have been written for other computers on your T.I.

TMS 9900 Editor/Assembler extends the computer by giving the user direct access to all system features, such as speech, sound and the graphics and interfaces. This language allows the fastest possible speed to be obtained from the micro computer's 16-bit microprocessor.

CLUB TOGETHER

TIHome is the TI 99/4a users' club. It was set up a year ago by keen hobbyist Paul Dicks and is run independently of TI. The annual membership fee is £9.95 for which members receive a news letter every two months, have access to a software library, and can benefit from TIHome's connections with the American 99/4 Users Association.

The club now has over 500 members. If you would like to join the club write to Paul Dicks at 157 Bishopsford Road, Morden, Surrey, SM4 6BH.

QUALITY GAMES

The availability, range and quality of software has been one of the chief criticisms levelled at the T.I. 99/4a since its launch in the UK.

Since then T.I. have been working hard to improve this state of affairs. In particular, they will be publishing a software review with names and addresses of all the independent software writers known to T.I. This is to be available in September 1982.

Other plans for improving the availability of software include a scheme whereby individual companies purchase patented T.I. cartridges and then write their own programs on them, which they can sell independently of T.I.

Texas is tight-lipped about which companies have taken up the offer so far, although it is known that Thorn EMI's computer wing has accepted the offer and will be producing software — mainly games — for the T.I. 99/4a.

T.I. manufactures some six hundred software packages itself. There are a number of business cassettes, some interesting educational packages, and a wide range of games including some of the old favourites such as Space Invaders and Pacman. The quality of the graphics on some of these games is of the traditional high standard associated with solid state ROM cartridges. It has to be said however, that these are not cheap, Space Invaders, for example, costs £40.

Milton Bradley a U.S.-based toy manufacturer produces a range of five games for the T.I. 99/4a which are imported to the U.K. by T.I. and are available from dealers.

In total there are over 1,000 packages available in the U.S. for the T.I. — on cassette, disc, or cartridge-manufactured by a number of companies. T.I. are negotiating with a number of U.K. importers to bring these packages into the country.

NOW READ ON . . .

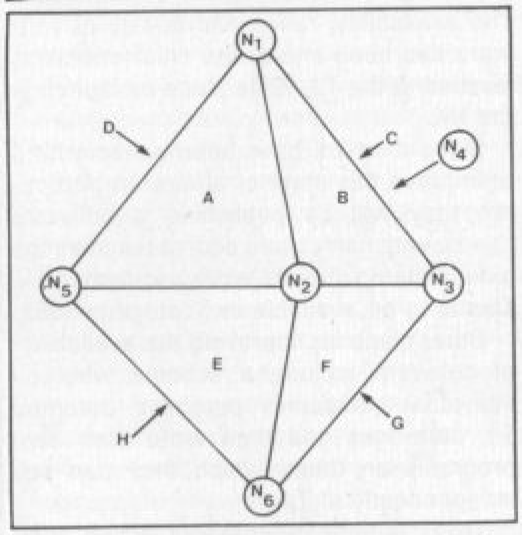
An instruction manual is supplied with the T199/4a and is written for the beginner. You will also receive a *Users Reference Guide* and a *Read This First* pamphlet which shows you how to set up your home computer.

For the more advanced user, Texas publish *Programming Basic* with the TI Home Computer. This 300 page book takes you beyond Beginners' Basic. It costs £7.

There is also a bi-monthly American magazine called the *99'er* which is written specifically for owners of T.I. home computers. It is now available in the UK from your local T.I. dealer at £2.35 or by subscription at £13.00 for six issues direct from M.P.I., 8 Cambridge House, Cambridge Road, Barking, Essex, IG11 8NT.

Brainware

MIND ROUTINES



Consider the octohedron above with the 8 faces marked a through to H. There are 6 nodes N_1-N_6 and four faces meet at each node.

By using the numbers 1 - 8 place each number on a face. There are four questions this month.

1. Calculate the node values as the sum of the four adjacent sides. What is the maximum product of all 6 nodes which can be obtained?
2. Using the node values as in 1 what is the minimum product of all 6 nodes which can be achieved?
3. Calculate the node values as the product of the four adjacent sides. What is the maximum sum of all 6 nodes which can be achieved?
4. Using the node values as in 3 what is the minimum sum of all 6 nodes which can be achieved?

You should submit your values for A-H for each of the 4 answers.

Example Suppose we numbered the sides A=1, B=2, etc H=8

Then the node sum $N_1=1+2+3+4=10$.

And the node product will be $N_1=1\times2\times3\times4=24$

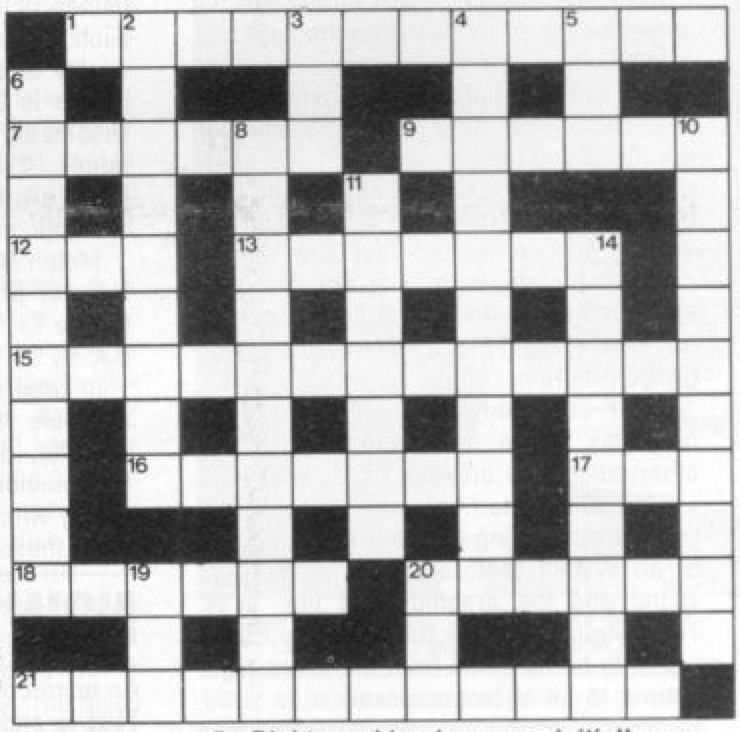
For all 6 nodes we have

Node	Node Sum	Node Product
1	10	24
2	14	60
3	18	252
4	22	672
5	18	160
6	26	1680

Product of sums = 25945920 2848 = Sum of products

These values lay somewhere between the maximum and minimum results.

NEVERA CROSSWORD



ACROSS

1. **Pacman ghosts in edible mode (4,8).**
7. **Sure me confused. Restart the program (6).**
9. **Articles on wood provide one kind of computer (6).**
12. **Times are mixed up (3).**
13. **Man, high class king, first class warrior (8).**
15./18. **across. "T" sights reassembled to join two points on a screen (8,5).**
16. **G Merlin I thinks it's a kind of Bug (7).**
17. **Upper class regret concerning surroundings (3).**
18. **Re-align, losing force becomes confused but ends up straight (6).**
20. **Stab or end this mixed-up process (6).**
21. **Match Ali mate adds up (12).**

DOWN

2. **Lean on a public relations "own goal" to make hard copy of computer game (4,1,4).**
3. **Take legal action against Barker (3).**
4. **Continuous read out pound handle of games interface (7,4).**
5. **Right machine language initially provides educational computer (3).**
6. **Chieftains converge on former C&VG computer battle ground (10).**
8. **Young lady states her intention to become crude about bomb H.Q. (7,4).**
10. **Good player sees G-Man in disorder (5, 5).**
11. **One Politician on rising ground in Adventure game (3,4).**
14. **Bulls eye sanctuary (5,4).**
19. **Programme: IF this was to be added to the 9'O Clock News . . . (3).**
20. **Computer Company in scenes one and two (3).**

SOFTWARE GLOSSARY

A beginner's guide to plain jargon

ALGORITHM: A process or set of rules to carry out a task or solve a mathematical problem.

ARRAY: A series of items arranged to form a meaningful pattern.

BASIC: The most widespread computer language which is one of the easiest to learn and is used for programming all microcomputers.

BIT: An abbreviation for a binary digit. It represents the smallest unit of information, for example 0 or 1, on or off.

BUG: A slang term given to a mistake in a computer program which prevents it from working. It can refer to a mechanical, electrical, or electronic fault.

BUS: The circuit over which data or power is transmitted.

BYPASS PROCEDURE: Method of getting vital information into a computer if the line control computer fails.

BYTE: A term to measure a number of Bits (Binary digiTS), usually there are eight bits to a byte.

CALCULUS: Alegbraic notation.

COLOR: American spelling used to call colour out of several U.S. computers, e.g. the Apple.

CURSOR: A position indicator used by most computers to show where the next character should be entered.

GET: A Basic command which tells the computer to scan the keyboard and return with either a numeric or string value.

GRAPHICS MODE: A mode in which the computer can produce graphical characters and displays.

HARDWARE: The general term given to all pieces of electronic and mechanical devices which make up a computer system, i.e. the actual machines.

INKEY$: A Basic command which checks the keyboard for input and places it in a string.

INPUT: Data or information which is fed into the computer.

INTEGER: A number which does not contain a decimal point, i.e. a whole number.

INTERFACE CARD: Communications system which enables computer users to transmit data using a variety of communications devices. There are international standards for interfaces RS-232 being perhaps the best known.

K: See kilobyte.

KILOBYTE: A measurement of memory capacity. 1K is equal to 1024 so 8K is equivalent to 8192 bytes.

L.E.D.: (Light Emitting Diode) Provides a simple display and consists of an electron tube which lights up when electricity is passed through it.

LOAD: Instruction which is used in conjunction with a cassette recorder to transfer programs from tape to the computer's memory.

MATRIX: Is an array of numbers in columns and rows — most microcomputers use a dot matrix printing system.

MENU: List of programs, questions, or procedures which are displayed on the screen for selection by the user.

PERIPHERALS: Equipment which is used with a computer system, e.g. printers, disc drives, and VDUs.

PLOT: To map or draw points on the screen.

RAM: (RANDOM ACCESS MEMORY) This is a memory chip which you can load programs and data to and from.

RAMPACK: A cigarette-case sized pack of extra RAM which plugs onto the back of a Sinclair ZX81.

RUN: Basic command word tells the computer to perform the numbered sequence of actions referred to as a program.

SOFTWARE: Another name for computer programs.

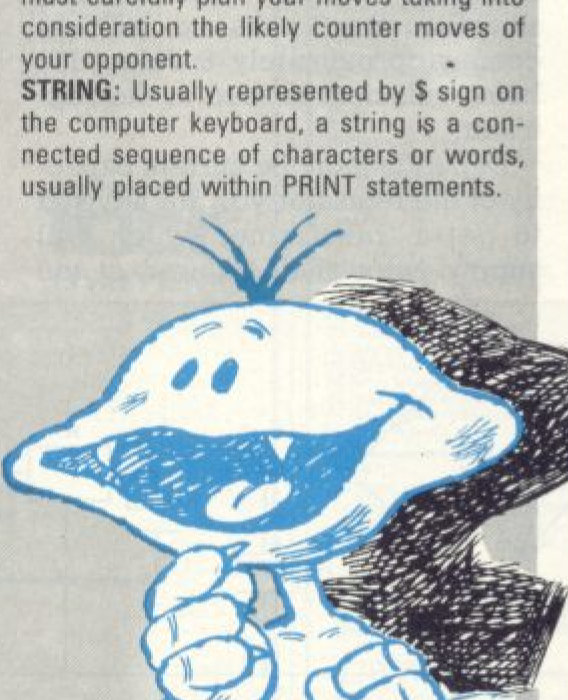
SOLID STATE: Refers to components made up of solid materials as opposed to the now defunct vacuum and gas tubes that you used to see in old television sets. Microcomputers have solid state circuitry.

STAR TREK: A popular computer game based on the TV series of the same name, in which the player takes command of the Starship Enterprise and roams the galaxy, destroying Klingons and investigating solar systems.

STATEMENT: An instruction in a computer program.

STRATEGY GAME: A game in which you must carefully plan your moves taking into consideration the likely counter moves of your opponent.

STRING: Usually represented by $ sign on the computer keyboard, a string is a connected sequence of characters or words, usually placed within PRINT statements.



AD INDEX

Kit Korner

POWER AND THE MICRO

I will shortly be looking at the construction of some very fascinating kits which can be added to several of the most popular home computers to turn them into a doer rather than just a thinker. When I came to think of it though, a problem struck me between the eyes. That is, the power consumption of the combined machine. For example, the standard power supply of the first batch of ZX81s would only run the computer and nothing else. The cure was to offer a larger unit to cope with all the subsequent parts. It would of course, been easier and cheaper to construct your own.

Single rail power supplies, i.e. those with only one voltage output, which is usually all that is needed for most of the most common machines, are quite easy to build, so long as you go about it in a sensible manner. I will give you a few ideas to work on and some useful precautions to take. It is of the utmost importance that the output is fully protected and fail-safe as a power surge on the board is fatal to the chips.

Power supplies have become far simpler by the introduction of voltage regulator I.C.s. These chips come in different voltages and current ratings, depending on your requirements. Most are fully protected from over voltage, short current and over heating. Basically all they need as an input is a DC voltage a couple of volts above that of the output.

There are, however, a few external components which are recommended for safe use. These are usually bypass capacitors and are generally available in your local components' shop, along with the rest of the bits and pieces.

Below, I have outlined a simple power supply with a transformer, a bridge rectifier comprising 4 diodes, a smoothing capacitor and the regulator unit, including capacitors. This arrangement would be quite adequate in its present form to cope with most applications. It would, however, be advisable to add a few extra safety components.

Going from left to right we first come across the transformer. Most these days have two separate primary windings so that they can be used with both 120 or 240 volt mains supplies. They must, of course, be wired for 240 volts in this country. The first extra component is a mains voltage dependent resistor or transient suppressor. These items are wired between the live and neutral of the mains. They act normally as an open circuit, until a higher than usual voltage is applied when they go short circuit. Make sure that your mains fuse is light enough to protect the mains cable from over heating, if the high voltage is maintained.

Also, make sure that the transformer, and all other components for that matter are able to supply or carry the current which you require. If you are aiming to achieve 5 volts at the output a 6-0-6 transformer will be sufficient if the secondary coils are connected in parallel.

From the diagram that would mean connecting pins 1 to 3 and 2 to 4 and taking the pairs to opposite sides of the bridge rectifier. Once smoothed the 6 volts a.c. will become approximately 8 volts, this being sufficient to feed to the regulator.

Depending on the current capacity of the regulator you are advised to get a transformer which will supply twice that required at the output. This will ensure that the transformer does not misbehave itself by giving out little spikes.

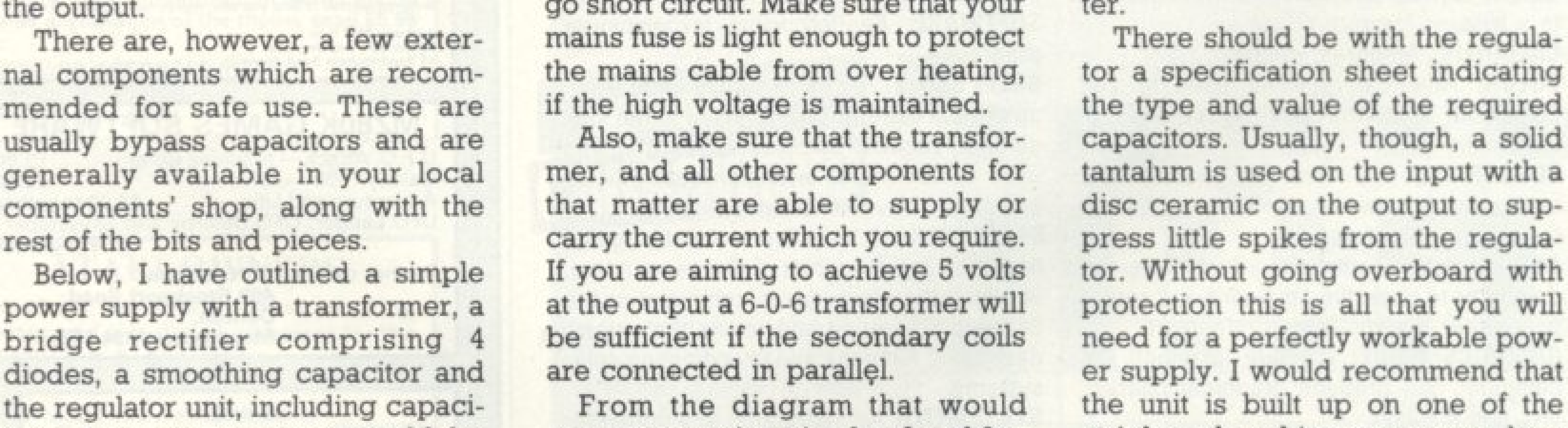
Transient suppressors could also be used before the diode bridge, although this is not absolutely necessary. Diode bridges can be obtained for different current ratings and you should aim to fit one which can cope with more than you require. This will keep the operating temperature well down.

To smooth the AC you will require a large electrolytic capacitor in the millifarad (thousands of microfarads) range depending on the current drain. Each capacitor is graded in capacity, voltage and ripple current. It is advisable to over estimate the last two by, say, a quarter.

Remember that the voltage specified will be the output from the bridge and not the regulator, so for a 5 volt regulator with 8 volt input a 10 volt electrolytic would be sufficient, although 16 volts will be better.

There should be with the regulator a specification sheet indicating the type and value of the required capacitors. Usually, though, a solid tantalum is used on the input with a disc ceramic on the output to suppress little spikes from the regulator. Without going overboard with protection this is all that you will need for a perfectly workable power supply. I would recommend that the unit is built up on one of the stripboards, taking care not to heat up the tracks too much.

This technique of building power supplies can be used to produce multiple rail versions for some of the more advanced machines if required. Enough has been written on power supply for you to go away and design your own power station, so be adventurous and save yourself some pennies.



BY KEITH MOTT

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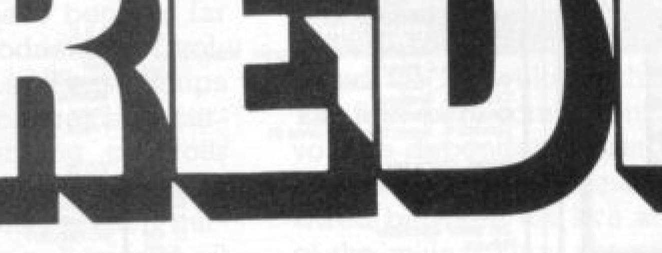
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Super Expander: 3K RAM and Hi-res graphics	(AC54J)	£34.95
Programming Aid: Additional commands, function Key programming etc.	(AC55K)	£34.95
Machine Code Monitor	(AC56L)	£34.95

Game Programs

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Road Race Cartridge	(AC65V)	£19.95
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Blitz Cassette	(AC67X)	£4.99

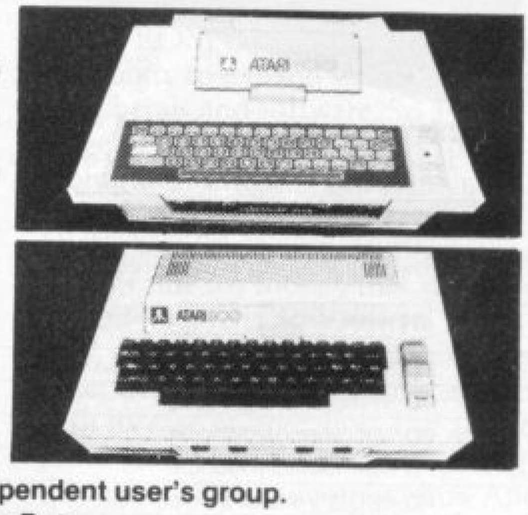
Books About VIC

Learn Programming on the VIC	(WA31J)	£2.50
VIC Revealed	(WA32K)	£11.50
VIC Programmers Reference Guide	(WA33L)	£16.50



4 Consoles available:

Atari 400 with 16K RAM	**(AF36P)**	**£249.95**
Atari 400 with 48K RAM	**(AF37S)**	**£319.00**
Atari 800 with 16K RAM	**(AF02C)**	**£499.00**
Atari 800 with 48K RAM	**(AF55K)**	**£590.00**



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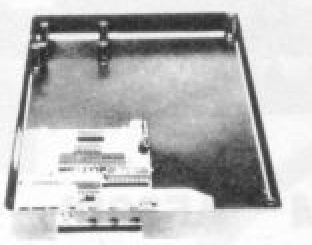
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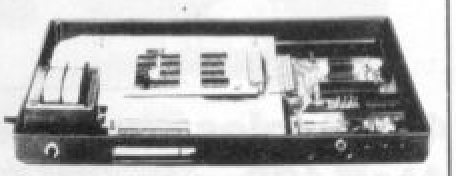
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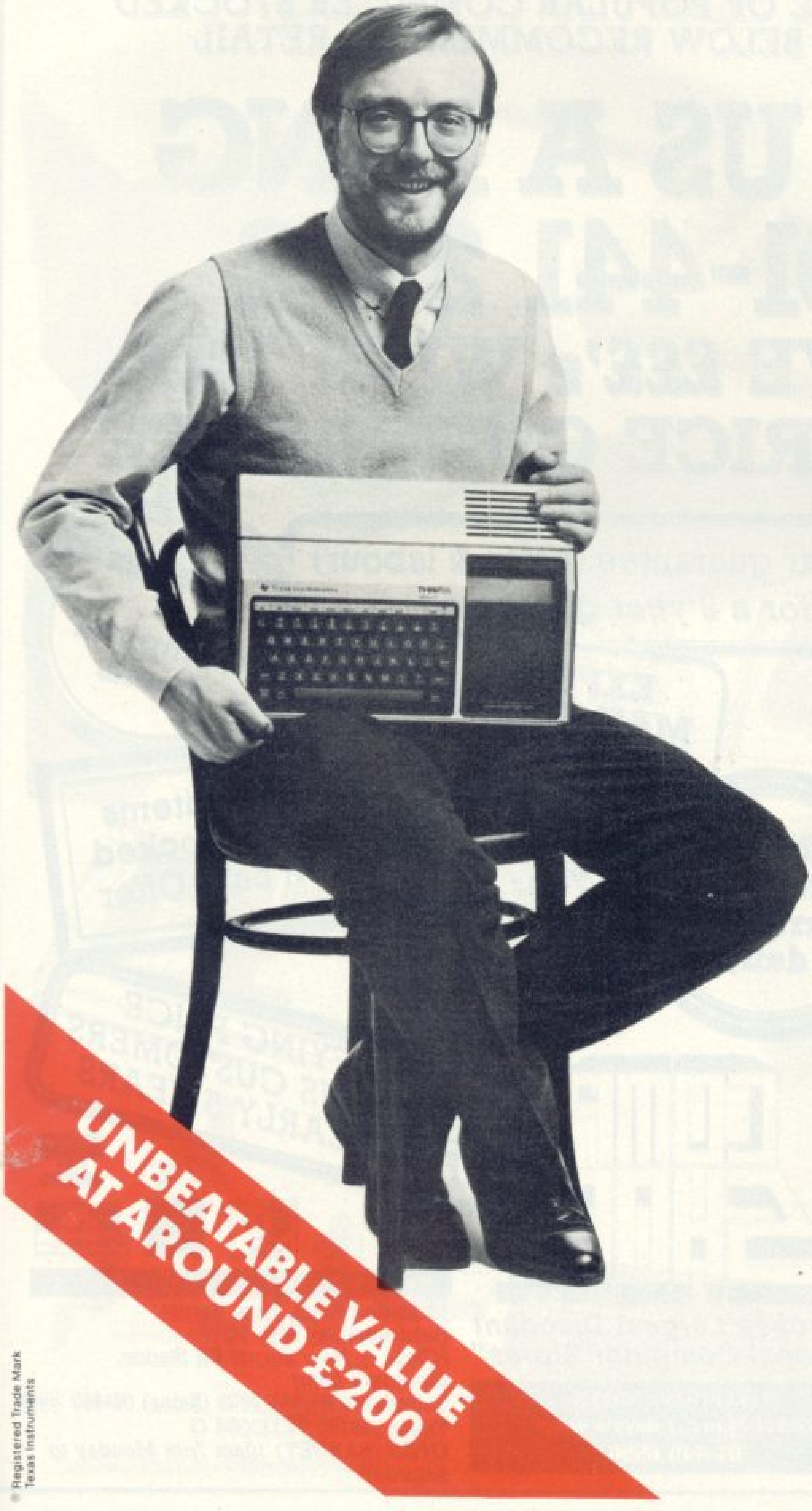
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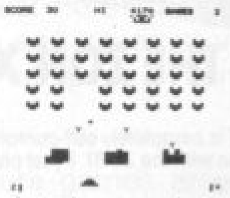
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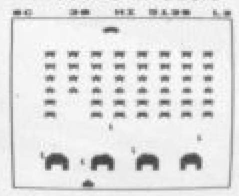


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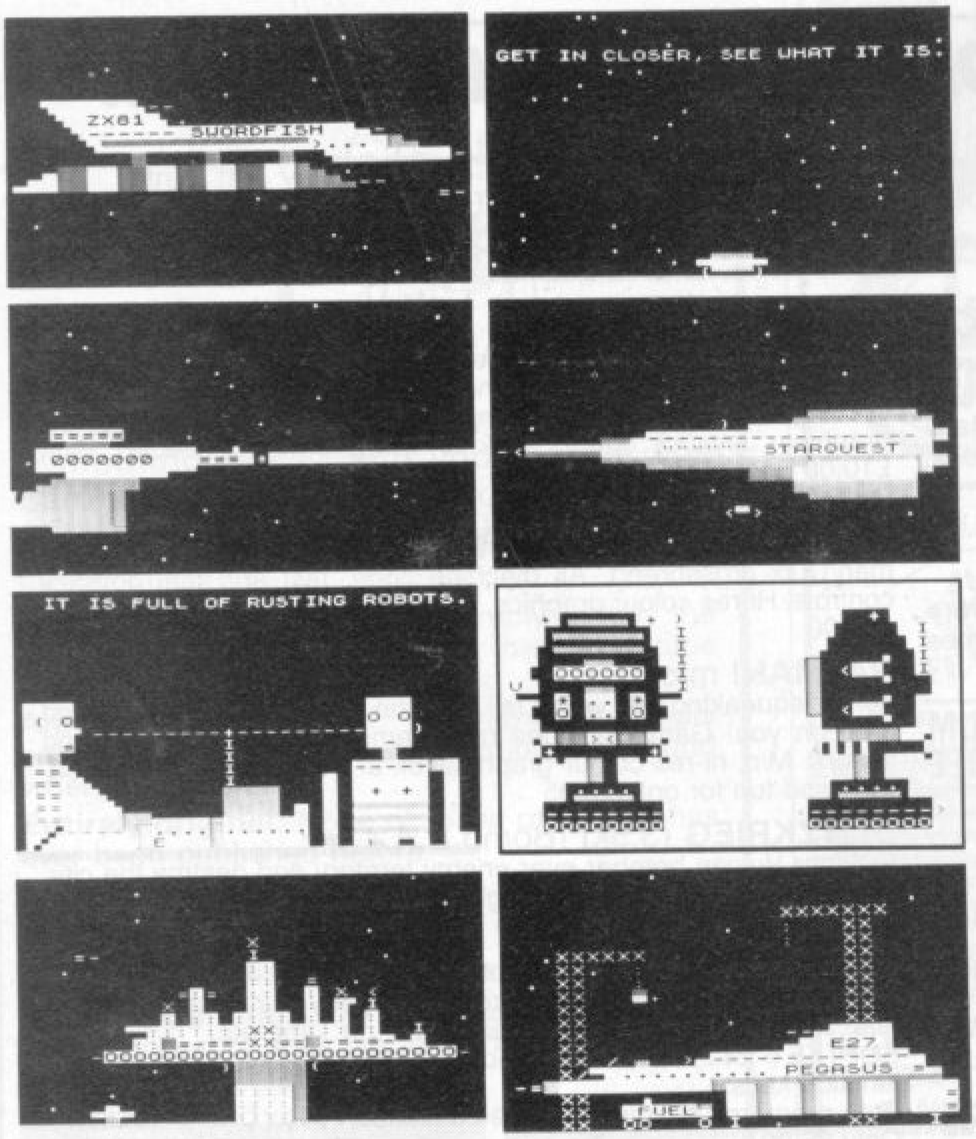
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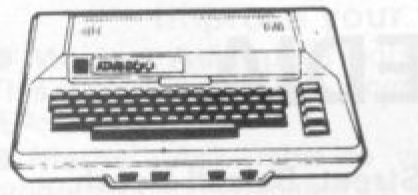
TRADER . . . A trilogy of three full 16K programmes that combine to give a fantastic 48K graphic adventure. As a galactic trader you seek your fortune and deal with some very bizarre customers indeed.

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We describe the major units here.

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The VIC Printer, like all VIC peripherals, offers a very high specification at a very competitive price.

It will print programs, letters, business data, graphic displays and so on.

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The VIC single-drive Disk Unit provides a fast, accurate and efficient means of storing and retrieving data and programs.

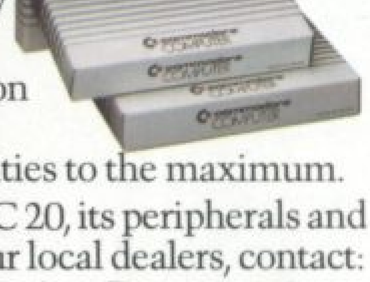
Together with the Printer, it transforms the VIC 20 into the ideal system for the small businessman or serious computer programmer.

Features include: 174,848 bytes capacity • Uses soft-sectored standard 5¼" single density floppy disks • Direct interface to VIC • Direct compatibility with Printer Intelligent system independent of VIC. (VIC RAM not required to run it).



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Special plug-in cartridges are available to expand VIC's memory. 3K, 8K and 16K RAM packs plug directly into the computer.



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For full details of VIC 20, its peripherals and software, and a list of your local dealers, contact: The Commodore Information Centre, 675 Ajax Avenue, Slough, Berkshire, SL1 4BG. Tel: Slough 79292.

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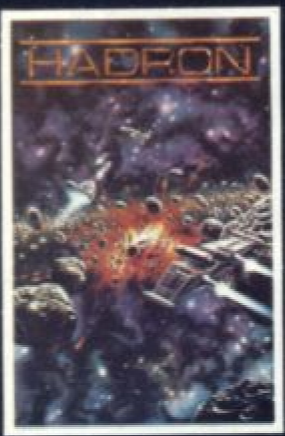
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1



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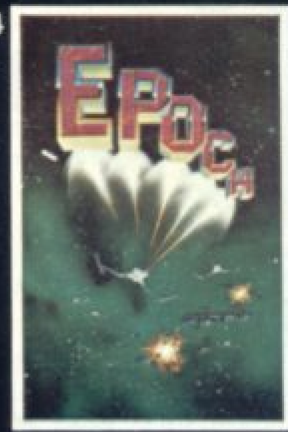
You set out to secure the secrets of the imprisoned Professor Eisenstadt. The in-depth plot, extensive vocabulary and colorful graphics make Kabul Spy a most intriguing adventure game. £19·95

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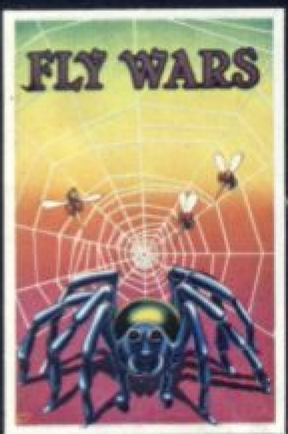
Take Theseus' place in the labyrinth and you will travel through 16 different three-dimensional mazes. Armed with a laser sword, you will encounter a myriad of fanciful and frightful creatures. £19·95

4



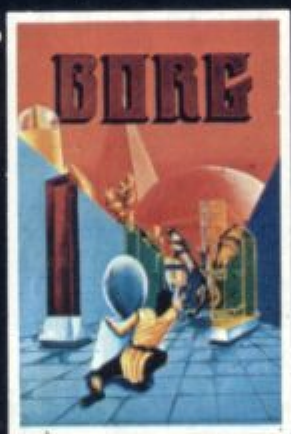
You are the last survivor of your starship crew on a suicide mission. Your one-man Space Cruiser has only one weapon — a limited quantity of very powerful atomic missiles. £19·95 *

5



Was the Spider able to destroy the Fly-Fighters, elude the B.S. and repair the damaged web??? Fly back in time with us and join the Alliance. See how well you do as the Spider-Fighter. £17·95

6



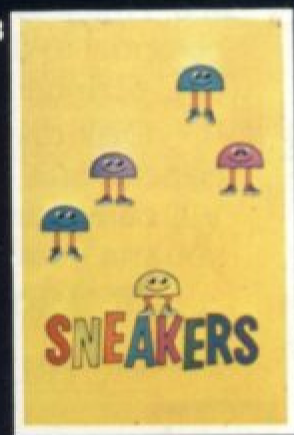
"There are ten rooms full of chambers and passages and they are all protected by this Drageroo that Grud created. It has wings and heat sensors and it can't be shot! £17·95

7



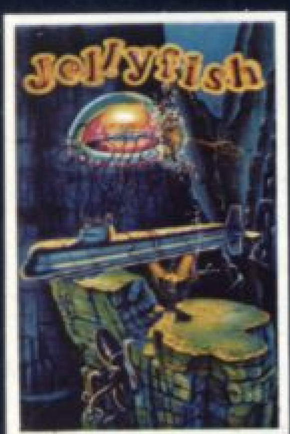
Enemy forces are advancing from all directions and begin to place Killer satellites in orbit around your station. And then, look out for the meteors! £17·95

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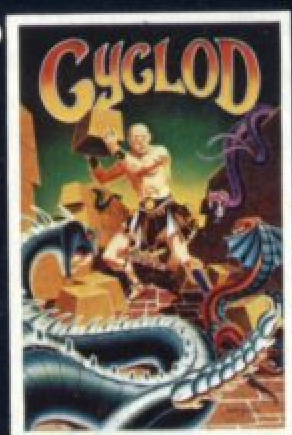
Sneaker's popularity is based on its seemingly endless variety of challenges. The game features some of the most animated and colorful characters to ever attempt to stomp you into submission. £17·95

9



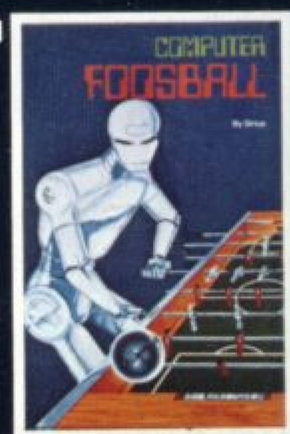
"As if it wasn't dangerous enough battling the Russians, now it's the Jellyfish too! We shot them, but they break into smaller pieces and keep coming. They've got to be nuclear mutants!" £17·95

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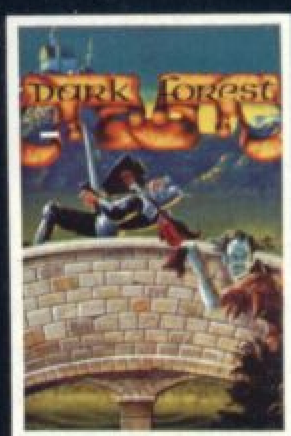
Cy·clod (sīklād) ***n.*** A mythical creature apparent in many legends: in Sirius legend, the video representation of a game wherein an eyeball fights snakes with bricks. £17·95

11



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13



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